

CRANFIELD UNIVERISTY

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Opening the black box:

What makes risk management pervasive in organisations?

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Abstract

This thesis is concerned with what pervasive risk management is, and how it can be achieved in practice. Specifically, it examines the effect of social processes and cultural factors on how risk management can be coordinated across and embedded within business processes and organisational culture.

A growing literature addresses what is termed risk management maturity: the capability of an organisation to assess, manage, communicate and govern risk (and opportunity). Notwithstanding its benefits, the emphasis of this literature on risk management benchmarking and standardisation has led, arguably, to a bureaucratisation of risk management process.

Research followed a case study strategy and data were gathered through semi-structured interviews. A total of 43 interviews were conducted in one private and one public sector organisation.

The findings describe a number of social processes and related cultural factors that significantly affected risk management pervasiveness in the two organisations. (1) Shared experience and respect for experience facilitated flexible coordination between operational and strategic risk management. (2) Informal, lateral communication integrated the knowledge of diverse stakeholders required to manage complex environmental risks. (3) Lack of common understanding of the purpose and function of risk management undermined coordination of risk management practice.

These findings progress the debate on the balance between standardisation and informal social process to achieve pervasive risk management, and contribute to a richer description of organisational risk management maturity. The findings are of value to risk managers wishing to embed the adaptive and coordinated risk management required in dynamic and complex environments.

Key words: risk management, risk governance, pervasive, coordinated, embedded, social process, risk culture.

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Abbreviations and organisations

AON	AON corporation
CAQDAS	Computer Assisted/Aided Qualitative Data Analysis
COSO	Committee of Sponsoring Organisations
CMM	Capability Maturity Model
ERM	Enterprise Risk Management
EU	European Union
FERMA	Federation of European Risk Management Associations
HRT	High Reliability Theory
HRO	High Reliability Organisation
HM Treasury	Her Majesties Treasury
IRGC	International Risk Governance Council
ICAEW	The Institute of Chartered Accountants in England and Wales
NAT	Natural Accident Theory
NGO	Non Governmental Organisation
OGC	Office of Government Commerce
PPM	Programme and Project Management
RMM	Risk Maturity Model
SOX	Sarbanes-Oxley Act

List of publications and presentations

Publications

Mauelshagen, C., Pollard, S., Rocks, S., and Denyer, D. ‘Risk management pervasiveness and organisational maturity: A critical review’ *Int. J. Business Continuity and Risk Management, Vol. 2, No. 4, 2011*

Mauelshagen, C., Pollard, S., and Denyer, D. ‘Deference to experience: a case study in the power utility sector,’ paper presented at Society for Risk Analysis annual meeting, Charleston USA. (December 2011).

Gormley, A., Mauelshagen, C., and Pollard, S. ‘Risk Maturity in the Water Utility Sector,’ paper presented at Society for Risk Analysis annual meeting, Charleston USA. (December 2011).

Mauelshagen, C., Pollard, S., Carter, M., and Denyer, D. ‘Respect for experience and organisational ability to operate in complex and safety critical environments,’ *Journal of Risk Research (February 2013), iFirst.*

Posters and presentations

Mauelshagen, C., Pollard, S., and Denyer, D. ‘Developing Risk Maturity,’ poster presented at Society for Risk Analysis-Europe annual meeting, London UK. (June 2010).

Mauelshagen, C., Pollard, S., and Denyer, D. ‘Achieving pervasive risk management’ poster presented at Doctoral Training Conference, Cranfield UK. (November 2011).

Mauelshagen, C., Smith, M., Pollard, S., and Denyer, D. ‘Developing Risk Maturity,’ poster presented at Risk Maturity Conference, Cranfield (May 2011).

Prpich, G., Rocks, S., Gormley, A., Shaw, H., Mauelshagen, C., Smith, M., Whelan, M. and Pollard, S. ‘Risk based science as a platform for informed decision making in UK environmental governance,’ poster presented at NERC Planet Under Pressure, London UK. (March 2012).

Mauelshagen, C., Pollard, S., and Gormley, A. ‘Risk culture in the water utility sector,’ presentation at WaterRF 4363 Risk workshop, London UK, (March 2012).

Allen, R., Mauelshagen, C., Luis, A., Jeffrey, P., Pollard, ‘Risk Management and the Board: Achieving Pervasive Risk Management in the Water Utility Sector’ paper presented at World Contamination Emergencies WCEC5 Conference, Muelheim (November 2012).

1. Introduction

1.1. Context and background

Risk analysis is a field that contains specialised terminology and a large number of constructs. Definitions are contested and terms are often used interchangeably, it is therefore essential to explain how these terms are to be used in this thesis and to position this research within the field. Risk analysis can be categorised as; risk assessment and risk management (Short 1984). Risk assessment focuses on providing scientific data to inform risk-based decisions (Younger et al. 2005; Robinson & Levy 2011). Risk management concerns risk-based decisions and the actions taken to control risk. In turn risk management can be further defined as risk communication, risk-based decisions making and risk governance. Risk communication concerns how risk is constructed and perceived (Fischhoff 1995; Slovic et al. 2005); Risk-based decision making involves decision analysis and modelling (Amendola 2002; Tversky & Kahneman 1992) and risk governance describes the organisational processes involved in managing risk (Renn & Walker 2008; Renn 2005). This thesis is set within the field of risk governance.

The term governance refers the multitude of actors and processes that lead to collective binding decisions and actions in organisations. Governance is underpinned by the allocation of decision rights bureaucracy (Grandori 1997), market mechanisms (Grandori 1997) communities of practice (Brown and Duguid 1991), knowledge transfer (Carlile 2004), trust (Bradach & Eccles 1989), identities (Ouchi 1980) and networks (Thompson, Francis & Mitchel 1991). Risk Governance refers to these

processes of organized decision making and actions in relation to risk (Boholm, Corvellec & Karlsson 2013).

While risk and attempts to reduce risk are not new (Cummins et al. 1998), there has been a dramatic rise in explicit and systematic risk management since the 1990s (Gephart et al. 2009; Power 2004). This has in part been a response to conspicuous organisational failures to manage risk, such as Chernobyl and the Columbia incident (Pidgeon 1991; Gheman, Jr 2003). Risk based systems of governance have been implemented in a wide range of business organisations and government departments (Gephart et al. 2009; Power 2004a). In parallel with the increase in formal risk management, the remit of risk management has moved from a focus so called ‘primary risks’, such as the impact of flooding or public exposure to toxins, to include ‘secondary risks’ that are created by the risk management entity itself, such as reputational risk (Power et al. 2009).

Risk analysis, the science of risk management, which has both informed and driven this trend, concerns how organisations identify, assess and mitigate factors which pose a risk to achieving their objectives. In recent decades the science of risk analysis has expanded beyond a predominantly technical discipline focused on the identification and assessment of risk to a broader, and arguably less defined, concept of risk-based organisational governance (Arena et al. 2010). In particular, the concepts of enterprise risk management (Kimbrough & Compton 2009) and risk management maturity (Strutt et al. 2006) constitute a shift towards increased focus on internal control and other organisational attributes that affect risk management capability. Risk governance is critical because the actions and decisions of people in organisations

determine how risk is managed (Pidgeon & Leary 2000). Thus, understanding of the people and organisational context is essential to a sustained ability to manage risk.

Risk maturity and enterprise risk management are two prominent organisational risk governance paradigms. Risk maturity concerns describing the business processes involved in managing risk and delineated them by their relative maturity in 'risk maturity models' (RMMs) (MacGillivray et al. 2007). RMMs typically focus on the organisational processes related to managing a single risk area, such as operational safety, and are often used for benchmarking organisational risk management capability (Strutt et al. 2006). Enterprise risk management (ERM) is a management system developed in response to prominent failures of organisational internal control, for example Barings Bank, Polly Peck and Enron (Beck 2009; Burnaby & Hass 2009). These events lead to increased regulatory requirement for internal control, such as the Sarbanes-Oxley act of 2002 in the USA and the Turnbull Report in the UK (ICAEW 1999; SOX 2002). To meet those requirements the Committee of Sponsoring Organisations (COSO) developed the Enterprise Risk Management Framework (COSO 2004). Since then a number of other ERM frameworks have been developed (PricewaterhouseCoopers LLP 2004; Deloitte 2006). ERM management systems have subsequently incorporated into the credit rating process (Standard & Poor 2007) and implemented in a wide range of private organisations (Kimbrough & Compton 2009). More recently ERM has influenced public sector risk management (Power 2004), including in Canada, Australia, the USA (Province of British Columbia 2012; AON 2011; Power 2008; Victorian Auditor-General's Office 2007) and the UK (OGC 2007; OGC & HM Treasury 2003; HM Treasury 2009; HM Treasury 2004). ERM differs from previous risk governance models in its emphasis on internal control

(Power 2008); secondary risks (such as reputational risk) (Power et al. 2009); and its aim to embed risk in all decisions with an organisation, from strategic to operational (COSO 2004).

Both RMMs and ERM are underpinned by the concept of risk management pervasiveness. Pervasive risk management is defined as risk management practices that are coordinated and consistent across an organisation. Pervasive risk management is required by RMMs and ERM on the basis that it is necessary to manage risks that span functional and hierarchal divisions and to achieve controlled and repeatable risk management practice throughout an organisation (MacGillivray et al. 2007; Paulk et al. 1993; COSO 2004; IRGC 2009). In this thesis I explore why, despite having formal processes in place, many organisations are finding it difficult to achieve pervasive risk management.

1.2. Problem statement

Many organisations, in both the public and private sectors, have implemented risk management systems. However, many organisations still find it difficult to achieve pervasive risk management. This inability to achieve pervasive risk management is widely reported by risk managers as a key factor contributing to shortfalls between executive ambition and actual risk management performance (Economist Intelligence Unit 2009; AON 2007).

1.3. Aims and Objectives

The research question which this thesis addresses is:

“What factors affect risk management pervasiveness in organisations?”

This thesis focuses on the factors influencing the embedding and coordination of risk management within organisations: with a focus on the cultural and organisational factors. The core aim is to contribute to an explanation for risk management pervasiveness.

The key research objectives are to:

1. Synthesise available literature and conduct a critical literature review to define pervasiveness and identifying the best explanation for risk management pervasiveness given current evidence.

2. Conduct two case studies investigating the cultural and organisational factors which influence risk management pervasiveness.
3. Carry out a cross case analysis of the results developed from the case studies in order to identify any cross cutting factors.
4. Evaluate existing evidence and theory in light of the results of the cross case analysis.
5. Help to explain risk management pervasiveness, based on the evidence gathered, generating novel insight to inform risk management practice and external theory.

1.3.1. Use of the term 'pervasive'

I recognise that use of the term pervasive in this Thesis is somewhat idiosyncratic.

Common usage of pervasive refers to the extending throughout, or being in every part of (see dictionary definitions below). We use the term pervasive to mean coordinated and consistent across an organisation. However, it is the sense of risk management practices and processes extending throughout the entire organisation we want to emphasise, hence use of the term pervasive.

Oxford dictionary - *to pervade* (pervadere per+vadere go, walk):

1. verb. pass or flow through; traverse (now rare)
2. verb. extend throughout; spread through or into every part of; permeate, saturate.
3. verb become diffused (now rare)

pervasive : (capable of) pervading

1.4. Thesis structure

Here the contents of each chapter are summarised and placed in the overall research process (Figure 1.1).

Chapter 2: Presents a review of the relevant literature. Current work on risk governance, risk culture and risk management maturity are described and critiqued (Figure 1.1). The concept of risk management pervasiveness, its definition and importance, in the current literature are explored. The literature review identifies a gap in current work regarding how organisations achieve pervasive risk management. This is used to formulate the research question (Figure 1.1).

Chapter 3: Describes the methodology and method used. This research followed a qualitative, abductive methodology. Data gathering was inductive and exploratory, allowing qualitative themes to emerge from the data. The research comprised two case studies, each carried out in a different organisation. In each case study risk management practice and factors affecting that practice were explored using semi-structured interviews. Subsequent data analysis retroductively applied current theories to develop a possible explanation for the emergent results (Figure 1.1).

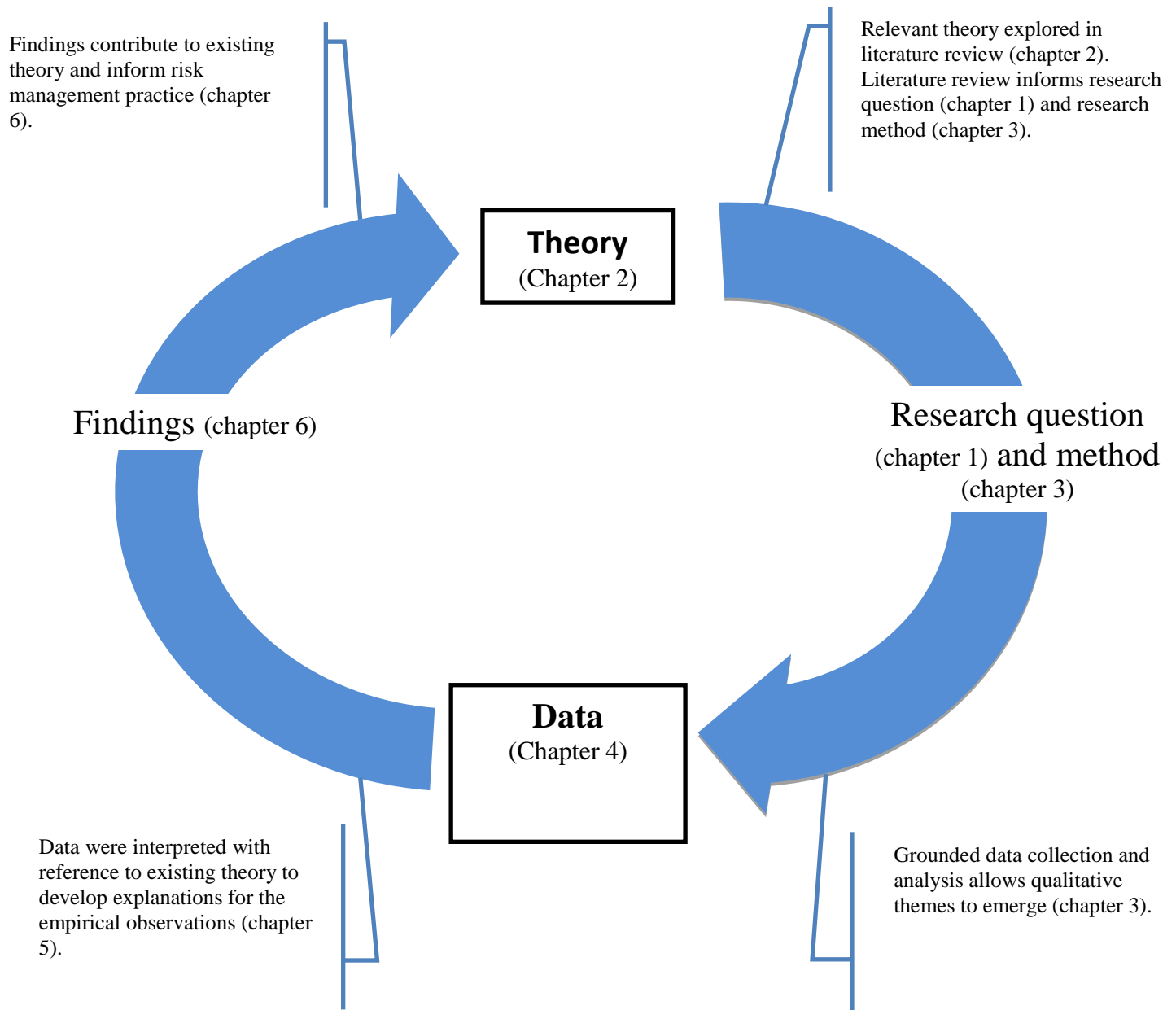
Chapter 4: Presents the data gathered by the research (Figure 1.1). The emergent themes are described and presented in tables giving examples the underlying data and number of interview transcripts containing each theme. A number of social processes and cultural factors that affected the risk management practice of the participants interviewed are identified from the data.

Chapter 5: Discusses the research findings with reference to relevant academic literature (Figure 1.1). Each case study is analysed independently to identify the key social processes and cultural factors affecting risk management practice. Then, through a cross case analysis the common themes; of coordination, dialogue, deference to expertise and shared mental models are identified. A conceptual model describing and explaining the findings is developed.

6. Conclusion and summary: Describes and summarises the core findings of this thesis (Figure 1.1). The novel insights are highlighted and practical implications for risk management practitioners offered.

7. Critical review of research: The strengths and weakness of this research are evaluated and suggestions for further research to develop the subject are outlined.

Figure 1.1.: Overview of research process and thesis structure.Figure 1.1.: Overview of research process and thesis structure. *The research process followed abductive logic, whereby data gathering was inductive to allow data to be developed with minimal theoretical bias but interpretation of that data drew on existing theory to develop the research findings and identify their contribution to the wider theoretical understanding of risk management pervasiveness.*



1.5. Contribution

The novelty and contribution to science of this thesis are discussed in chapter 6. Here the contribution is summarised:

- The research provides a **close description of the heterogeneity and disjointed nature of risk management practice** within the two case studies. This provides empirical of the importance of coordination to achieve pervasive risk management.
- The research identified a number of **social processes and associated cultural factors** that affected the ability of the two organisations studied to achieve consistent and coordinated risk management practices. The method of coordination is identified as **coordination through mutual adjustment**. The findings expand understanding of the role of one of the social processes, **deference to expertise**, from allocation of decision rights to also include coordination. These findings contribute to the debate on the balance between standardisation and social process to achieve pervasive risk management.
- The research identifies and develops a **possible mechanism** by which the social processes identified facilitated coordination: the **integration of distributed knowledge**, including experiential and tacit knowledge.
- The research **identifies a relationship between coordination through mutual adjustment and organisational ability to adapt to a dynamic and unpredictable risk environment**. This expands understanding of the organisational attributes required for maturity levels four and five (Strutt et al. 2006) and, together with the social processes and cultural factors identified,

contributes to a richer description of organisational risk management maturity.

1.6. Motivation

Here the research presented in this thesis is outlined in order to establish how it is intended to be judged. This research followed a qualitative case study approach (Yin 2008) as will be described in more detail in Chapter 3. As such the work falls into the interpretive social sciences that aim to describe social behaviour and the processes which shape it, based on the richness and depth of data obtained through interviewing people (Locke 2001). This research aimed to explore the subject of interest, risk management pervasiveness, and thus contribute to an explanation of how organisations can achieve pervasive risk management. This type of research does not develop a hypothesis in advance of data gathering as the emphasis is on developing findings from the data with minimal theoretical or researcher bias. Further, the outcome of this research is not intended to be statistically generalisable findings; rather the aim is to develop in-depth insight into risk management pervasiveness that contributes to understanding of that subject. Thus, the aim is for *analytical* generalisation, where the findings of this research are used in further studies to develop understanding of the subject– a theory *building* approach (chapter 3).

2. Literature review

^a A modified version of this literature review was published in Int. J. Business Continuity and Risk Management, Vol. 2, No. 4, 2011 305. Copyright © 2011 Inderscience Enterprises Ltd.

In this literature review I address the question: ‘does existing theory of risk governance explain why, despite tools and processes being in place, there is still a perceived shortfall in risk management outcomes?’ To address this issue, I review the underlying assumptions of risk governance, focusing on the concept of risk management maturity which attempts to explain organisational risk management capability. I reveal significant inconsistencies in the way the organisational culture has been conceptualised and illuminate assumptions that are rarely acknowledged and cause confusion in the way risk management maturity models are understood and utilised. I identify two basic types of risk maturity model: type one, focused on coordinating risk behaviour across the whole organisation through standardised processes and outputs; and type two, focused on deeply embedding risk management into the culture of the organisation. I discuss the strengths and weaknesses of both models before reconceptualising risk management maturity by amalgamating both perspectives. Type one maturity models address the issue of coordination but rarely incorporate organisational culture, despite evidence of its importance. In contrast, type two maturity models incorporate organisational culture but do so in an unsystematic manner and do not adequately define organisational culture or explain its relationship with risk maturity. I propose a new conception of organisational risk management maturity that takes into consideration both the extent to which risk behaviour is

coordinated across the whole organisation and the depth to which risk management is embedded in its' culture. I define risk management that is coordinated and embedded in an organisation to be 'pervasive'.

2.1. Organisational risk governance

Organisational governance, decision-making and behaviour are increasingly being driven by risk and risk management practices (Pollard et al. 2002; Power 2004). Risk is commonly defined as the function of the probability of consequence multiplied by its relative magnitude (Hulett & Hillson 2002; Klinker & Renn 2002). In the last few decades, the scope of risk management in organisations has widened considerably through advances in the technical ability to estimate probabilities and impacts (Jonkman 2003; Aven & Steen 2010), the codification of risk-based decision making and management processes (IRGC 2005; Herath & Wijayanayake 2010) and the identification of the organisational processes involved in risk management (MacGillivray et al. 2007; Strutt et al. 2006). Risk-based decision making has been championed as an effective and equitable way to utilise limited resources to manage risk for public and private organisations (Pollard et al. 2002; Kimbrough & Compton 2009; Prime Minister's Strategy Unit 2002). The related field of safety science has had a significant influence on risk management by revealing the conditions that give rise to organisational failure and its avoidance (Hopkins 2002; Cooper 2000; Pidgeon 1991; Pidgeon & O'leary 2000), including organisational and systemic factors (Reason 2000; van Vuuren 2000; Sorensen 2002). The concept of 'safety climate', the individual and shared attitudes towards safety (Flin et al. 2000;

Mearns & Flin 1999), and 'safety culture', the shared systems of meaning (Cox & Flin 1998; Guldenmund 2000; Choudry et al. 2007), have highlighted the importance of organisational culture to preventative risk management. A number of studies have demonstrated relationships between measures of safety climate, organisational culture and safety performance (Shannon 1997; Hoff et al. 2004). Organisational culture also features strongly in theories explaining organisational failure and failure avoidance including normal accident theory (NAT) and high reliability theory (HRT) (Perrow 1999; Roberts & Rousseau 1989), which have had a significant influence on safety and risk management science (Reason 2000; Tamuz & Harrison 2006; Van Den Eede et al. 2006). As such, I draw on these related literatures throughout this paper.

However, whilst there are many commonalities with risk management, the literature on safety science and high reliability organisations tends to focus on optimising organisational safety performance (Sorensen 2002; Hopkins 2007). In contrast, the science of risk management science is concerned with identifying and assessing all potential risks including reputational, financial and regulatory risks. Therefore, it is important to acknowledge that risk-based decisions often have to achieve a balance of risk against gains and losses in the context of multiple, potentially conflicting, objectives and values (Leveson et al. 2009). Despite the development and implementation of risk management tools and processes, risk management failures are common and many organisations are still perceived to be underperforming in terms of risk management (FERMA 2008; IRGC 2009). For example, in the banking crisis, originating in 2007, although similar risk management tools and technologies were adopted across the industry, some banks proved more vulnerable to risk than others (Strebel & Lu 2010; Valencia 2010). The International Risk Governance Council (IRGC) report on risk management categorised risk management shortcomings into

two categories (IRGC 2009). The first, concerned understanding and assessing risk, the second, concerned the ability of organisations to implement risk management tools and processes to achieve desired outcomes (IRGC, 2009). It is on this second category that this review will focus.

The IRGC (2009) attributed shortcomings in the implementation of risk management tools and processes to a lack of leadership commitment, and failure of coordination due to a lack of resources, skills, capabilities and a 'suitable' organisational culture (IRGC, 2009). Deficient organisational culture (Economist Intelligence Unit 2009b; IRGC 2009) and flawed corporate leadership (Strebel & Lu 2010; Valencia 2010) are common explanations of poor risk management in this literature. The field of risk maturity directly addresses the issues of organisational capability to effect risk management tools and processes and has developed a number of risk maturity models (RMMs) that describe the factors, conditions and mechanisms that determine an organisation's ability to achieve risk management goals (Hillson 1997; Strutt et al. 2006; MacGillivray et al. 2007). The underlying concept and structure of RMMs have their root in the capability maturity model (CMM), developed by the Software Engineering Institute in the 1990s (Paulk et al. 1993). As originally conceived, the tool attempts to measure an organisation's capability to effect a business process by evaluating attributes for each of five successive levels of capability, the so-called 'maturity levels' (Figure 2.1.). Since the original CMM, later renamed the 'Software CMM', a number of incarnations have been developed to assess organisational maturity in different organisational functions, including risk management (Hillson 1997; Mutafelija & Stromberg 2003; MacGillivray et al. 2007). RMMs vary in content, but generally contain descriptions of the organisational attributes required to

achieve maturity. These often include organisational structure, strategy, business processes, and culture. RMMs are proposed as a way for managers to improve risk management processes, benchmark performance and demonstrate their capability to third parties, including regulators (Strutt et al. 2006). RMMs also share many features with enterprise risk management (ERM), a framework that encompasses the entire management structure, rejecting the notion of risk management as an isolated specialism (Aabo et al. 2005; Kimbrough & Compton 2009). ERM principles are embodied in a number of management standards (Deloitte 2006; PricewaterhouseCoopers LLP 2004) and have been implemented by many organisations (AON 2007) and government departments (Prime Minister's Strategy Unit 2002).

Figure 2.1: Current model of risk maturity Figure 2.1.: Current model of risk maturity
Figure one represents an existing risk maturity model, showing its focus on defined processes and coordinating risk behaviour.

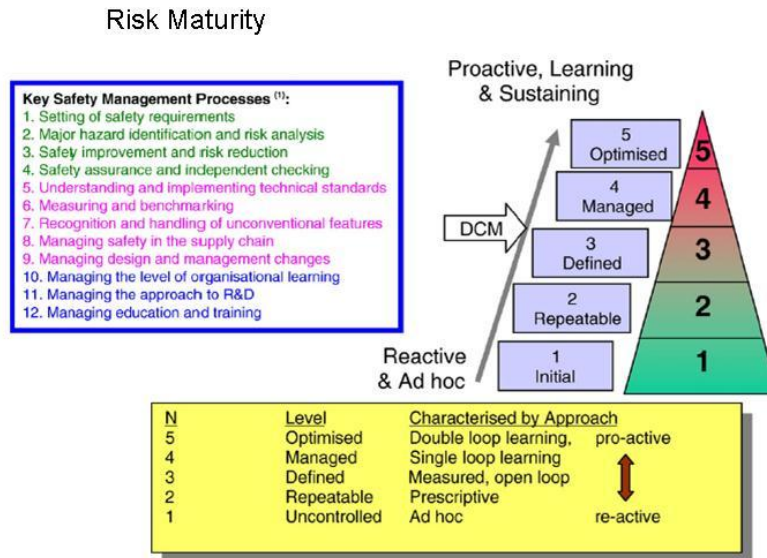


Figure adapted from Strutt *et al.* (2006)

2.2. Risk management pervasiveness and organisational maturity

The literatures on RMMs and ERMs tend express the assumption that ‘good’ risk management and high maturity requires risk management to be pervasive in an organisation. I argue that risk management is pervasive when it is coordinated and consistent across an organisation. Descriptions of ‘good’ risk management in the ERM and RMM literature typically include a centrally-defined and uniformly applied risk management policy, process and ‘appetite’; the integration of risk management functions with wider organisational functions; and a common approach to risk management throughout an organisation (Hillson 1997; Duodu et al. 2003; PricewaterhouseCoopers LLP 2004; Deloitte 2006; Strutt et al. 2006; MacGillivray et al. 2007; Economist Intelligence Unit 2007; HM Treasury 2009).

However, achieving pervasive risk management is clearly a challenge for many organisations, (Economist Intelligence Unit 2009; FERMA 2008; AON 2007),

“With a strong culture and awareness of risk cited as being the most important factor in determining the success of risk management, close integration between risk and other functions in the organisation is clearly important. At present, however, progress on embedding risk in other parts of the business appears to be patchy. This finding supports the earlier conclusion that, although risk management has become established in mainstream business practice, instilling a culture of risk at every level of the organisation remains a central challenge.” (Economist Intelligence Unit, 2007)

The Economist Intelligence Unit (2009) survey of 364 risk managers found that their confidence in others organisational subgroups' understanding of risk and efficacy of communication with risk managers varied considerably. Confidence was much higher among non-executive directors, executive management and finance than other organisational groups, particularly business units. The Economist Intelligence Unit (2009) survey also found only 28% of risk managers agreed that their organisation was effective at 'instilling an awareness of risk throughout the organisation'. A survey of 555 European risk managers reported that the influence of risk management on decision making differed according to the type of decision being made: strategic decision making being most influenced by risk management (FERMA, 2008). A survey of 103 senior managers responsible for risk found that only 10% of organisations described their ERM programme as embedded across their organisation (AON, 2007). The same survey found that understanding and support for ERM objectives was high with senior managers, lower with middle management and lowest with employees (AON, 2007). These surveys offer little explanation as to why desired risk behaviour was not pervasive in these organisations except for general references to the lack of a 'strong risk culture' (Economist Intelligence Unit, 2009). This review reveals two aspects of pervasive risk management. The first characteristic of pervasiveness is the extent to which an organisation is able to influence risk behaviour of individuals and thus, coordinate risk behaviour across the organisation. The second facet of pervasiveness is an organisation's ability to deeply embed a common set of values, norms and assumptions regarding risk management into to culture of the organisation. I explore these two concepts of risk management pervasiveness in more detail.

2.3. Risk maturity models: risk coordination focus ^b

^b For a more general review of coordination theory see Appendix A.

Type one RMMs are most similar to the original CMM, do not explicitly include organisational culture and focus on the coordination and control of risk behaviour (MacGillivray et al. 2007; MacGillivray & Pollard 2008; Strutt et al. 2006) (Figure 2.1.). The concept of pervasive risk management and its relation to risk maturity found in type one RMMs stems from the CMM. In the CMM, mature organisations have business processes which are explicitly defined, documented and enacted uniformly across the whole organisation. Furthermore, lessons learned by individuals and subgroups are disseminated across the whole organisation, keeping changes in behaviour coordinated (Paulk et al. 1993). Like the CMM, group one RMMs propose centralised control through formal rules and codified procedures as the means to coordinate behaviour across an organisation, repeat good process outcomes and avoid negative outcomes through preventative measures (Paulk et al. 1993; Strutt et al. 2006; MacGillivray et al. 2007). Although group one RMMs require that the most risk mature organisations are capable of ‘double loop learning’ (Agyris & Schon 1978), whereby the organisation can question and change the fundamental basis of their risk management, this requirement is confined to the top maturity level (Figure 2.1.). Group one RMMs set out the ‘tasks and activities’ of risk management in detail, focusing on the tangible actions that lead to desired risk management outcomes (Strutt et al. 2006; MacGillivray et al. 2007). These codified processes are expected to be expressed in the risk behaviour of individuals. In order that this is achieved, type one RMMs require that management directly controls risk by acting on quantitative feedback (Strutt et al. 2006; MacGillivray et al. 2007). Thus, coordination is proposed

to be achieved by standardisation of processes and outcomes, and direct supervision (Mintzberg 1979). Such coordination of behaviour through standardisation of process and outcome is arguably problematic when viewed in the context of wider understanding of how organisations manage risk and the factors influencing risk behaviour. For example, a significant body of literature contends that organisations should utilise less rigid modes of coordination in order to achieve better performance in dynamic and uncertain environments (Klinke & Renn 2002; Kelly 2009), or when coordinating multiple communities of practice, each with distinct knowledge and perception of risk (Faraj & Xiao 2006). In these situations, the maintenance of normal organisational function is partly dependent on the flexible and emergent behaviour of individuals (Hannan & Freeman 1984; Weick et al. 1999; Bigley & Roberts 2001). Coordination in such situations involves mutual adjustment between the individuals involved (Mintzberg 1979) and cannot rely solely on standardised processes and outcomes (Weick 2005). Such complex coordination must be based on the development of a shared set of norms and values (Mintzberg 1979; Faraj & Xiao 2006). The literature suggests that coordination through common norms and values does not replace standardised processes and outcomes but provides an additional degree of complexity and flexibility to risk management (Faraj & Xiao 2006; Bigley & Roberts 2001). Recognition of the role of norms and values is reflected in the importance attributed to risk culture. Organisational culture is widely held as a critical, if not the most critical factor, affecting risk management maturity (Kelly 2009) in much of the literature on RMMs (Duodu et al. 2003; HM Treasury 2009); enterprise risk management (Kimbrough & Compton 2009; Taylor 2007; AON 2007); by credit rating agencies (Standard & Poor 2007); by management consulting firms (PriceWaterHouseCoopers 2009) and among risk management practitioners

(Economist Intelligence Unit 2007; Economist Intelligence Unit 2009). The recognition of importance of organisational culture may have influenced the trend away from centralised and process orientated, to decentralised and outcome orientated risk management (Kelly 2009), however, this has not been incorporated into type one RMMs.

2.4. Risk maturity models: organisational cultural depth focus

Type two RMMs (Hillson 1997; Duodu et al. 2003; OGC 2007; HM Treasury 2009) explicitly include organisational culture, emphasising the pervasiveness of cultural elements such as shared attitudes or understandings towards risk. Type two RMMs pay greater recognition to the role of organisational structures, artefacts and practices beyond those of codified rules and procedures in determining organisational risk maturity. In this way, group two RMMs reflect the trend towards a greater emphasis on organisational culture and a move away from process orientated, expert risk management (Kelly 2009). In type two RMMs pervasiveness is defined as a common set of cultural factors embedded throughout an organisation (Deloitte 2006; Economist Intelligence Unit 2007; IRGC 2009). This assumption is apparent in the attributes used to describe ‘good’ risk culture such as: ‘a common risk appetite’, ‘common attitude towards risk management’, ‘common risk awareness’, and ‘common risk understanding’ (see Table 2.1.). Note that the definitions of risk culture in Table 2.1. are taken from ‘grey literature’ (government and industry surveys and reports) rather than peer reviewed papers. This reflects the purpose of this literature review and research project which is to examine and analyse risk management practice. That is, how risk management is enacted and understood by practitioners.

This is distinct from the theory of risk and risk management drawn from peer reviewed papers which I use to inform the research methodology and analyse of the risk management practice observed. The industry and government surveys and reports used to populate table 2.1. were selected from reputable organisation that are highly influential among risk management practitioners and therefore likely to be representative of risk management practice more widely. In particular, three large surveys of risk management practitioners (AON 2007; Economist Intelligence Unit 2009) were included.

Table 2.1.: Attributes used to describe or characterise a ‘good’ risk culture in practice. *Attributes used in this table were only those used directly to describe risk culture (stars indicate that the source uses the corresponding attribute). The original wording of the indicators has been modified to compile this table but the original meaning has been maintained. This table indicates the diversity of indicators used to describe ‘good’ risk culture and the inconsistency in their use.*

Attribute	Source													
	Risk maturity models				Enterprise risk management						Other			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A challenge culture	X													
“No blame” culture	X													
Clear and effective risk communication	X		X			X		X				X		X
Common attitude towards risk management			X		X									
Common or pervasive risk appetite									X		X		X	X
Common risk awareness			X							X		X		X
Common risk understanding					X				X	X	X	X		
A defined risk appetite		X					X					X		
Degree to which risk management structure is defined		X						X						
Extent to which risk management is embedded in business functions	X						X	X				X		
Facilitates integrating risk management functions					X									
Homogeneous and pervasive risk culture								X						X
Innovation in response to risk	X													
Risk management linked to performance measures	X			X				X						
Senior management have positive attitude towards risk management			X	X				X						
Strong ethical values									X	X				
Strong leadership on risk					X							X		
Strong position of risk management in organisational structure							X							
Transparency of risk management processes							X					X		

Sources: (1) HM Treasury (2009), (2) Office of Government Commerce (2007), (3) Doudu *et al.* (2003), (4) Hillson (1997), (5) AON (2007), (6) Funston *et al.* (2007), (7) Standard and Poor (2007), (8) Deloitte Touche Tohmatsu (2006), (9) PricewaterhouseCoopers (2004), (10) Reynolds (2003), (11) PricewaterhouseCoopers risk culture survey (2009), (12) Economist Intelligence Unit (2009) (13) IRGC (2009), (14) Economist Intelligence Unit (2007).

The features, attributes or characteristics used to describe risk culture in the risk management literature (Table 2.1.) have often been transferred from the literature on safety culture (Flin et al. 2000; Guldenmund 2000). Research that associates safety culture and performance highlights the importance of a range of cultural factors including: communication, learning, management commitment, common values, blame culture and leadership commitment (Sorensen 2002; Clarke 1999; Arboleda et al. 2003; Mearns et al. 1998; Elmiyeh et al. 2004; Waring 2005; Vredenburg 2002; Flin et al. 2000). However, the risk management literature does not define the attributes of risk culture in sufficient detail, applies them inconsistently and contains diverse assumptions about what organisational culture actually is. The attributes used to describe risk culture variously focus on aspects of organisational structure, behaviour, attitudes, and values (Table 2.1.). Most type two RMMs follow the basic structure of the CMM and type one RMMS, simply ‘adding on’ risk culture attributes. Because the underlying concept of risk maturity is not modified to incorporate risk culture, these new attributes are more akin to a collection of unrelated features that must be accumulated to achieve risk maturity, rather than being generated by an underlying theory of risk maturity. In the remainder of this review, I propose a model of risk maturity, define risk culture and offer a theoretical understanding of its relationship with risk maturity, drawing on established, existing theory and recent findings.

2.5. Cultural and behaviour

A critical insight into the relationship between risk culture and pervasive risk behaviour comes from ethnographic studies of risk and safety management. One such study observed organisational subcultures and the relative agency of proposed risk management actions (Howard-Grenville 2006). The observed relationship was that the greater the alignment between the proposed action and the dominant organisational culture, the greater its influence on risk behaviour (Howard-Grenville 2006). Conversely, when proposed actions or routines were not strongly embedded in organisational culture they were more likely to be changed and co-opted by individuals (Howard-Grenville 2005). The key cultural factors identified were values and norms regarding how risk was conceptualised and which risk mitigation strategies are preferred. For example, while a purely technical solution to a risk was accepted by the organisational subculture that defined risk as impediments to manufacturing processes and assumed solutions to be technical and universally applicable; it was rejected by the subculture that included stakeholder perceptions as a source of risk and thus favoured varied solutions, sensitive to multiple stakeholders (Howard-Grenville 2006). This relationship between organisational culture and risk behaviour is substantiated by a number of similar studies on the relationship between occupational subcultures and safety rules, a closely related field (Gherardi et al. 1998; Gherardi & Nicolini 2000; Richter & Koch 2004; Antonsen 2009; Knudsen 2009). These studies also found that the behaviour of individuals was significantly influenced by organisational culture, particularly work related subcultures. Both safety rules and safety subcultures contained a perception of the practices and underlying values that constituted good safety behaviour. Employee compliance or non-compliance with

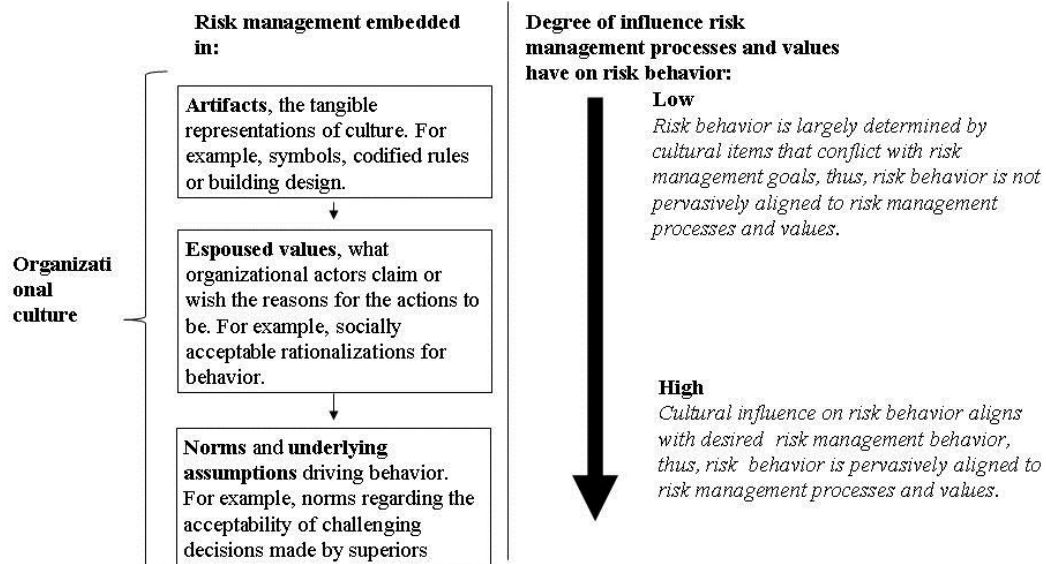
safety rules was partly determined by whether or not those rules aligned with values and norms embedded in subcultures. If safety rules encapsulated a practice or underlying value that conflicted with the safety subculture then employees would resist behaving in accordance with those rules (Antonsen 2009). These findings suggest that elements of safety or risk management (practices and values) that do not align with organisational culture are less influential on the behaviour of individuals, while those elements that are aligned with organisational culture appear to have greater influence on behaviour. Thus, the extent to which a risk management practice or value influences behaviour throughout an organisation is, at least partly, determined by the degree to which it aligns with organisational culture (Howard-Grenville 2005; Howard-Grenville 2006). To conceptualise this findings in the context of risk maturity I draw on existing theory describing coordination of behaviour by shared norms and values (Mintzberg 1979) and cultural depth (Schein 2004). Schein's (2004) model of organisational cultural depth, delineates the layers of culture, from superficial artefacts (physical manifestations of culture) to deeper values and the deepest level; underlying assumptions. This model distinguishes between values which are consciously expressed (espoused values) and those which are unconscious (underlying assumptions) (Schein 2004; Schein 1986). Additionally 'norms', defined as the social desirability of a particular behaviour, allow us to compare the gap between an organisation's values and the behaviour of individuals (as an expression of norms) (Raz & Fadlon 2006).

I propose a relationship between risk maturity and risk culture, whereby the deeper risk management is embedded in the layers of risk culture, the greater its influence on risk behaviour. Following this, the greater the influence on behaviour the more

pervasive 'good' risk behaviour becomes and the more risk mature the organisation (Figure 2.2.). However, if risk management's processes or values are not embedded deeply into an organisation's culture, this can undermine the pervasiveness of risk management. For example, an organisation may have aligned organisational artefacts with risk management, such as creating mission statements on risk and codifying risk management processes, but if the espoused values such as managers rhetoric are not aligned, then risk management's influence on behaviour may be limited (Summerill et al. 2010). Alternatively, despite leadership's public expression of appropriate values, risk management's influence on individual behaviour might be limited if people do not share a set of taken for granted assumptions relating to risk management. For example, an underlying assumption that professionalism requires self-sufficiency which conflicts with risk communication objectives (Storey & Buchanan 2008).

Figure 2.2.: Conceptual model of cultural alignment.

This model of cultural alignment proposed that the alignment of risk behaviour and risk management is determined by the degree to which risk management is embedded in organisational culture. In order for desired risk management processes and values to be pervasively expressed in risk behaviour those processes and values must also be aligned with cultural artefacts, espoused values, norms and underlying assumptions. This figure uses model of organisational culture based the definitions of organisational culture by Schein (1986) and Raz and Fadlon (2006).



The deeper risk management is embedded within organisational culture the less behaviour driven by cultural elements will clash with desired risk management behaviour. Thus, 'good' risk behaviour will be pervasively expressed throughout the organisation.

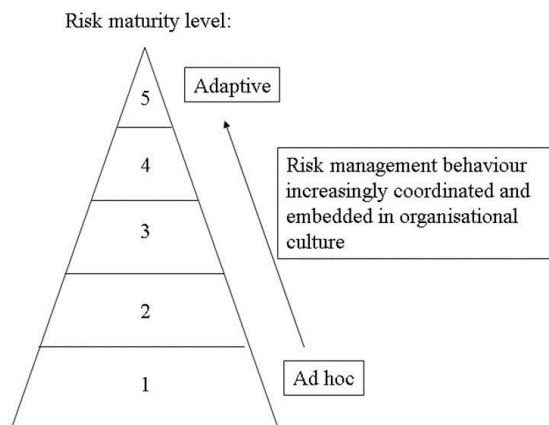
2.6. Towards a new model of risk management maturity

I begin with a brief reiteration of current type one and two RMMs. Current RMMs can be described in three distinct stages. The first stage, in both type one and two RMMs, contains the lowest level of risk maturity, level one, which is distinguished by little or no coordination in risk behaviour throughout an organisation. The second stage, comprising maturity levels two, three and four, reflects increasing coordination of risk maturity behaviour in group one RMMs and increasing embedding of a common risk culture in group two RMMs. The third stage, made up of the fifth and highest maturity level, is characterised by double loop learning (Agyris & Schon 1978), meaning the organisation is capable of questioning and changing the fundamental basis by which it manages risk. This review suggests that there is a case for linking the extent to which risk behaviour is coordinated across an organisation and the depth to which risk management is embedded within organisational culture. Accordingly, in this RMM, levels two to four will represent increasing coordination of risk behaviour driven by an increasingly deep embedding of risk management within organisational culture (Figure 2.3.). Initially, at maturity level two, cultural embedding is superficial (restricted to artefacts and espoused values) and standardised processes and outputs play a prominent role in coordinating risk behaviour and driving pervasive risk management. Thus, this new risk maturity level two is largely similar to type one RMMs up to maturity level four. In the subsequent levels of risk maturity, levels three and four, cultural embedding becomes the dominant driver of pervasive risk management. These maturity levels are defined by embedding risk management in the less tangible elements of organisational culture: norms and assumptions. Thus, this new model of risk maturity is set apart from existing models

by directly linking coordination of risk behaviour and risk culture and by capturing the progressively deeper embedding of risk management in organisational culture which leads to pervasive risk management. The highest level of risk maturity, level five, will remain characterised by organisational ability to fundamentally change established ways of managing risk in the organisation (Strutt et al. 2006). However, this new model level five risk maturity emphasises the ability to question and challenge all factors coordinating risk behaviour, including norms and underlying assumptions.

Figure 2.3.: A new model of risk maturity

Figure three represents the updated model of risk maturity proposed in this literature review. The main feature is that pervasive risk behaviour is achieved by embedding risk management processes and values in organisational culture. This model recognised the importance of organisational culture in driving risk behaviour. The model of organisational culture used is based the definition of organisational culture by Schein (1986) and Raz and Fadlon (2006).



Maturity level	Characterised by
1	Uncoordinated risk management behaviour
2	Risk behaviour coordinated through standardized processes and outcomes, risk management embedded in cultural artefacts and espoused values
3	Risk management embedded in cultural norms, risk behaviour further coordinated
4	Risk management embedded in underlying assumptions, risk behaviour further coordinated
5	Adaptive risk management, open loop learning allows all aspects of existing behaviour to be challenged

2.7. Evaluation and implications of proposed maturity model

Although the new maturity model proposed in this literature review describes cultural embedding as a linear process I recognised that it is likely to be more complex in reality, with values driving the creation of standardised processes which in turn establish norms and so forth. However, I argue that representing progress in risk maturity in this linear, hierarchal manner does reflect the overall process of progressively deeper embedding of risk management in organisational culture, into layers of culture that are increasingly less visible, more difficult to change and more insidious in their influence on behaviour (Schein 1986). I also put forward the point that until artefacts and espoused values are established it is likely to be unclear whether or not they will conflict with any established norms or underlying assumptions that might exist. It will only be by acting to try and change risk behaviour through artefacts and espoused values that I will learn about the nature of the organisational culture in which they exist (Weick 1995).

In order to elucidate the proposed model of risk maturity I drew on the risk culture attributes identified across the literature. The risk culture attributes most prevalent in the literature (Table 2.1.) were used to illustrate the cultural layers (Schein 2004; Raz & Fadlon 2006) that underpin the new risk maturity model (Table 2.2.). Thus, I provide a tool illustrating the attributes of an organisation as its risk management became increasingly embedded in its organisational culture: from superficial artefacts to the deeper levels of norms and underlying assumptions. I hope this can be used by risk practitioners to identify the degree to which risk management is embedded in

their own organisation's culture and provide a guide to further embed risk management.

Table 2.2.: Risk maturity attributes by level of organisational culture

The most prevalent attributes used to describe ‘good’ risk culture categorised by Schein (2004)’s typology or organisational culture, representing the most superficial layer (artefacts) to the deepest (underlying assumptions). For each layer the description of ‘good’ risk culture from the literature was used to create risk maturity attributes. These risk maturity attributes describe the features of an organisation which has embedded risk management in the corresponding layer.

Layer of organisational culture (Schein, 2004)	Risk maturity attributes: attributes signifying the embedding of risk management within cultural layers.	Sources
<p>Artefacts: tangible manifestations of organisational culture which both reflect and influence deeper culture elements.</p> <p>Embedding risk management with artefacts is a requirement for level two risk maturity.</p>	<p>Clear and effective risk communication: clear and effective mechanisms for managers and staff to raise risk related issues, widespread access to risk information and a clear message on risk from organisation leadership.</p>	(HM Treasury, 2009; Doudu <i>et al.</i> , 2003; Funston <i>et al.</i> , 2007; Deloitte Touche Tohmatsu, 2006; Economist intelligence Unit, 2009; IRGC, 2009)
	<p>Defined risk management processes and outcomes embedded throughout organisation: risk management is embedded in the organisations codified processes and measured outputs as a core part of organisational function.</p>	(HM Treasury, 2009; MacGillivray <i>et al.</i> , 2007; Strutt <i>et al.</i> , 2006; Paulk <i>et al.</i> , 2006; Standard and Poor, 2007; Deloitte Touche Tohmatsu, 2006; Economist intelligence Unit, 2009)
	<p>Defined and transparent risk management structure: risk management roles and responsibilities are formally defined, with clear board oversight.</p>	(Office of Government Commerce , 2007; Deloitte Touche Tohmatsu, 2006; Standard and Poor, 2007; Economist intelligence Unit, 2009)
	<p>Risk management outcomes linked to wider performance measures: risk management performance is embedded in recruitment and performance appraisal for individuals, departments and the organisation as a whole.</p>	(HM Treasury, 2009; Hillson, 1997; Deloitte Touche Tohmatsu, 2006)
<p>Espoused values: the expressed or desired rational for behaviour.</p> <p>Embedding risk management with espoused values is a requirement for level two risk maturity.</p>	<p>Leadership behaviour and rhetoric must strongly support wider risk culture, particularly culture norms conducive to ‘good’ risk behaviour</p>	(Funiston <i>et al.</i> , 2007; PricewaterhouseCoopers, 2004; Reynolds, 2003; Economist Intelligence Unit, 2009)
<p>Norms: implicit and explicit social rules which define the desirability of actions and are thus manifest in behaviour.</p> <p>Embedding risk management with norms is a requirement for level three risk maturity.</p>	<p>A challenge culture and a ‘no blame’ culture: cultural norms which encourage and rewards individuals to challenge or report behaviour they think it detrimental to risk management effects.</p>	(HM Treasury, 2009; Waring, 2005; Storey and Buchanan, 2008)
	<p>A common and pervasive risk appetite: a common understanding of what is and is not an acceptable level of risk in key areas, such as safety, driven by a common set of ethical values.</p>	(PricewaterhouseCoopers, 2004; Reynolds, 2003; PricewaterhouseCoopers risk survey, 2009; IRGC, 2009; Economist Intelligence Unit, 2007)
	<p>Senior management have positive attitude towards risk management</p>	(Doudu <i>et al.</i> , 2003; Hillson, 1997; Deloitte Touche Tohmatsu, 2006)
<p>Underlying assumptions: taken for granted values based on unconscious beliefs about the nature of reality.</p> <p>Embedding risk management with underlying assumptions is a requirement for level four risk maturity.</p>	<p>Common risk awareness and common risk understanding: a common set of assumptions of the nature of risk, where it originates from, how it can be managed and how it relates to the organisations core purpose. These underlying assumptions about risk will influence how organisational members perceive and respond to risk.</p>	(Doudu <i>et al.</i> , 2003; PricewaterhouseCoopers, 2004; AON, 2007; Economist Intelligence Unit, 2007; Economist Intelligence Unit, 2009)

2.8. Conclusions

Risk management pervasiveness is a key theme running through the literature on risk management maturity. This review reveals two aspects of pervasive risk management. The first aspect is the extent to which an organisation is able to influence risk behaviour of individuals and thus, coordinate risk behaviour across the organisation. The second aspect is an organisation's ability to deeply embed a common set of values, norms and assumptions regarding risk management into to culture of the organisation. RMMs fall into two types according to their treatment of pervasiveness: one type focuses on pervasive risk behaviour, achieved through standardised processes, outcomes and direct management control. The second type focuses on embedded a common risk culture and influencing or coordinating risk behaviour through 'soft' mechanisms such as shared norms and values. Thus, this literature review revealed a divide in the literature concerning the relative roles of standardization and social processes to achieve pervasive risk management. Further, the literature review revealed a lack of clarity and empirical research regarding the role and function of cultural and social factors in achieving pervasive risk management. In this literature review I have proposed a theoretical model linking organisational culture with coordination of risk management. However, empirical research is needed to explore and describe how risk management practice is coordinated in reality.

3. Methodology

Research question: “*What factors affect risk management pervasiveness in organisations?*”

3.1. Methodology selection

3.1.1. Summary

In order to address the research question a wide range of research strategies and philosophies were considered (these are described in appendix B). In order to understand social phenomena like risk management pervasiveness, it is important to analyse social behaviour in a natural setting with sensitivity to researcher influence on the observation and analysis of data (Locke 2001; Neuman 2011). Therefore, an abductive, qualitative research methodology following a case study strategy was selected. Data were primarily gathered through semi-structured interviews. This approach provided an in-depth investigation of the informal social and cultural factors affecting risk management pervasiveness.

3.1.2. Rationale for qualitative approach

The literature review (chapter 2) highlighted the importance of social and cultural factors to risk management pervasiveness. Organisational culture concerns human beliefs, attitudes and behaviour built on individuals’ perception and experience (Guldenmund 2000; Smircich 1983). Further, organisational culture may not be

comprised of a single set of values or assumptions but often contains subgroups with differing values or assumptions and is continually evolving (Schein 2004). For these reasons a quantitative approach which would require variables to be defined and standardised in advance was unsuitable (Denscombe 2007). Therefore, a qualitative was selected as most suitable (Denscombe 2007).

3.1.3. Rationale for case study approach

The aim of this research was to contribute to an explanation of risk management pervasiveness by identifying and describing organisational factors that affect risk management pervasiveness. The literature review (chapter 2) revealed that there is a paucity of research evidence addressing risk management pervasiveness that takes into account the role of organisational context (social, institutional and cultural factors).

Eisenhardt (1989) identifies three aspects of the case study approach that make it suitable for explanation building (also referred to as theory building), namely:

- Constant juxtaposition of conflicting evidence reduces influence of researcher preconceptions and increases probability of generating novel theory.
- Developed theory is likely to be testable and falsifiable.
- Developed theory is likely to be empirically grounded because theory development is closely linked with data gathering and analysis.

Furthermore, the importance of wider organisational context on organizational behaviour (Lounsbury 2008; Johns 2006) makes a case study approach desirable for

its ability to take account a wide range of contextual factors, for example individual, institutional and cultural (Yin 2008). Therefore, a case study approach, aiming to contribute to identify factors which explained risk management pervasiveness, was selected as an appropriate method (Yin 2008).

3.1.4. Rationale for abductive approach

The literature review (chapter 2) established that there was little consensus on risk culture and other informal organisational processes affecting risk management practice. Followed an abductive approach (Kelle 2005) allowed the research to explore emergent and unexpected findings while incorporating existing knowledge and theories. An adductive approach requires that the researcher attempt to remain theoretically agnostic (Henwood & Pidgeon 2006) while retrospectively seeking theories that may explain the emergent findings (Kelle 2005) in order not to force the data or its interpretation to 'fit' existing theory. A grounded approach to data gathering, analysis and explanation building that emphasised basing the emergent explanation in the empirical data was selected for its compatibility with an abductive approach (Locke 2001; Kelle 2005). The researcher employed grounded theory methods of data gathering and analysis (constant comparison, inductive coding, and theoretical sampling) (Locke 2001; Charmaz 2006; Bazeley 2007) and, once data were gathered, considered a wide range of theories when developing an explanation for the results (Kelle 2005). It is emphasised that in following abductive logic primacy was given to empirical observations and therefore, existing theories were adapted to fit the results and not *vice versa* (Kelle 2005).

3.1.5. Rationale for insider perspective and semi-structured interviews

The values and assumptions held by individuals within the case study organisations were central to the research. By gaining insight into individual values and assumptions the aim was to build a picture of how these are shared across the organisation (Schein 2004; Howard-Grenville 2006). Therefore, gaining an insider perspective on individual's values, assumptions and perspectives was critical to the research.

Semi-structured interviews were identified as the most appropriate way to gain insight into actor's perspectives and thus the affective and cognitive factors affecting risk-based decisions and behaviour (Crandall et al. 2006). Questions were open ended and neutrally phrased (Whyte 1982) in order to emphasis the insider perspective in the data gathered. Open-ended questions were also selected to allow flexibility in data gathering, facilitate in-depth exploration of the interviewees' knowledge, establish a rapport with the interviewee and thus develop a truer picture of the respondents' risk management behaviour and reasons for it (Robson 2002).

3.2. Methods

3.2.1. Case study selection

The case studies were chosen to be examples of organisations attempting to achieve pervasive risk management. Two case studies were carried out in two organisations. The case studies were conducted in organisations attempting to embed risk management at all organisational levels, from strategic to operational. Further, medium to large organisations (2000 plus employees) were selected as these are typical of organisations attempting to achieve formal, integrated and organisation-wide risk management processes such as ‘enterprise risk management’ (AON 2007; Economist Intelligence Unit 2009).

A multi-case strategy was chosen in order to increase the probability of getting relevant data and the credibility findings through replication logic (Yin 2008). Following the principle theoretical replication (selecting cases because of expected differences) (Yin 2008) case studies were selected in the private sector and public sectors because it was expected there may be differences in risk management practice between these sectors. Enterprise risk management and efforts to achieve pervasive risk management began in the private sector (Arena et al. 2010) but are being increasingly adopted by public sector organisations (Power 2004; Kleffner et al. 2003; Lenkus 2001). However, there are significant differences between private and public sector organisations in areas critical to Enterprise risk management, namely corporate objectives (Osborne & Gaebler 1993; Osborne 2000) and internal audit (Goodwin 2004).

Case study one was conducted in a (private sector) power utility. Case study two was conducted in a central government department. Both organisations fulfilled the case study selection criteria of size (over 2000 employees) and were attempting to implement systematic, organisation-wide risk management. Case study two developed into two distinct dimensions (knowledge transfer and shared knowledge) that were analysed separately (chapters 4.4 and 4.5 respectively) in order to fully investigate those themes. The central government department was originally intended to be the subject of a single case study; however the two distinct research themes (both relevant to core research question) were judged to warrant separate treatment. A total of **twenty one** interviews were conducted in case study one and **twenty two** in case study two by the researcher (CM). Additional data from twenty three interviews (unpublished) carried out in the case study two organisation by Dr. Frank Schiller (FS) of Cranfield University were directly relevant to the theme of knowledge transfer and were incorporated into ‘case study two – knowledge transfer’. Thus, ‘case study two – shared knowledge’ (chapter 4.4), drew on a total of **forty five** interviews. All interviews were analysed by the researcher (CM).

3.2.2. Case study design

Data were gathered through semi-structured interviews comprising open ended questions (Whyte 1982; Crandall et al. 2006). Interview questions were open-ended and developed based on the literature review. In order to neutrally explore the factors affecting risk-based decisions and practices, interview questions focused on those decisions and practices without assuming what might be influencing them.

Participants were asked to describe their risk management practices and then the factors informing and influencing those practices. Questions were phrased slightly differently in each case study to make sense to the context of each organisation. For example, in case study one of a power utility, some questions referred to managing the resilience of the electrical grid, whereas some questions in case study two of a government department referred to risk in policy development. The questions asked can be found in Appendix C. The questions used by FS in the additional twenty three interviews were also open-ended and had a similar focus. They focused on issues of organisational learning, asking what knowledge was used for risk management and how that knowledge was created and shared. The questions (asked by FS) regarding what knowledge was used for risk management were relevant to case study two, and were incorporated into that case study.

Following the exploratory aim of this research and abductive methodology (Locke 2001; Kelle 2005), data gathering and analysis in each case study followed the core research question but as the research developed, focused on the emergent themes in the data. Thus, the focus of each case study was driven by the data gathered within the constraints of the core research question.

Prior to data gathering and finalisation of interview questions a pilot study was carried out (Yin 2008) in order to develop and test the interview questions for relevance, comprehensiveness and clarity. First, documentation of each organisation's structure, risk management policies and processes were analysed and draft interview questions developed. Second, several meetings with key staff including general risk managers and relevant senior managers were conducted in order to define the scope of the study

and gain senior management support. Third, the researcher conducted informal interviews with four to five key employees involved in risk management over the course of at least two days during which the interview questions were tested. Finally interviews were conducted over a period of several months. In addition, observation of organisational artefacts and behaviours while on site were recorded in a field notebook and by camera, and were used to supplement interview data. Artefacts included posters, notices and internal publications. Interviewee selection, interviewing and data analysis are discussed in more detail in the following sections.

3.2.3. Interview methodology

Ethics approval for the following interview methodology was obtained from Cranfield University Ethics Board. Prior to each interview a one-page summary of the research aims and purpose was emailed to each interviewee so that they were aware of the nature of the study. The flexible nature of semi-structured interviews allowed the researcher to further explore any interesting topics that emerged during interviews (Whyte 1982). Where necessary, the researcher asked follow-up questions via telephone or email.

Each interview comprised thirty to forty questions (Appendix C) which were ordered in the following manner:

- Introduction by the researcher and reiteration of confidentiality and right of interviewee to terminate interview at any point and withdraw their data at any point up until publication of data.
- Pause to answer any questions the interviewee may have.

- Non-threatening warm up questions.
- Questions on the role of the interviewee regarding risk and risk management.
- Questions investigating the factors affecting the interviewee's risk-based decisions and behaviour.
- Questions on how the interviewee deals with typically problematic aspects of risk management such as 'determining risk appetite' or 'risk-risk trade-offs'.
- Straightforward 'cool-off' questions and time for interviewee to bring up any topics they deem relevant.
- Closure.

Interviews were carried out face-to-face, one-to-one and in the workplace (with two exceptions where this was impossible and the interviews were carried over the phone).

Interviews were carried out in a private space (private meeting room) where interviewees were more likely to speak freely without fear of being overheard. In three occasions use of private meeting rooms was not possible and the interviews were carried out in noisy cafeterias to minimise the risk of being overheard.

Interviews were recorded with permission and transcribed verbatim by a professional transcription company (see appendix D^a for examples of transcribed interviews and appendix E^a for all transcribed interviews). Interviews were transcribed quickly (within two weeks of an interview) to allow data analysis to be carried out concurrently with interviewing. This facilitated the 'emergent and sequential' nature of the grounded research processes whereby emergent results guide subsequent data gathering (Lincoln & Guba 1985). Transcribing interviews also allowed data and

results to be more rigorously checked and peer reviewed (chapter 3.2.5.). Due to technical issues three interviews were not recorded and transcribed verbatim, in these cases the interviewer made notes during the interview. In addition, the interviewer made notes during all interview on emergent themes which could be explored in subsequent interviews. However, in order to retain the focus of the research and not to privilege early interviews, all interviewees were asked the questions on the same core themes (Appendix C), with additional questions emerging from prior interviews being added at the end. Interviews lasted a minimum of one hour, sometimes lasting over two hours. Data collection stopped when interviewee responses were easily coded within existing codes without necessitating the creation of new codes. At this point it was judged that no new substantive information was being gathered.

^a *Full list of transcribed interviews is supplied on CD to examiners but may not be available with the thesis when it is published in Cranfield University library.*

3.2.4. Data analysis

Data was analysed thematically using Computer Assisted/Aided Qualitative Data Analysis (CAQDAS) software (NVivo qualitative data analysis software, 2008). Data analysis drew a grounded approach whereby results and conclusions were developed through a coding process underpinned by constant comparison between the emerging results and the underlying data (Figure 3.1.) (Locke 2001). Data coding was inductive and iterative, seeking to identify and categorise variables; identify relationships between variables and develop an explanation for the observed phenomena (Bazeley 2007; Charmaz 2006). Open codes (Anselm Strauss & Corbin 1990) describing the

data were generated using a grounded approach by enquiring of the data: ‘what risk-based decisions or practice are taking place?’; ‘what is affecting or driving the described risk-based decisions or practice?’ and ‘what organisational context is the risk behaviour taking place in’ (complete transcripts of two interviews with codes highlighted can be found in Appendix D^a, a full list of codes can be found in appendix F^a, examples of two complete codes can be found in appendix G). Constant comparison between emerging codes and original data helped ensure results were grounded in the data (Glaser & Anselm Strauss 1967; Ahrens & Dent 1998). Relationships between open codes were identified using the query functions of NVivo 9TM (NVivo qualitative data analysis software, 2008) and by identifying theoretical links between codes. Relationships between open codes were not coded as codes themselves, rather they are explored in the discussion and emerge as the core social processes and cultural items identified (Appendix J: Complete coding hierarchy). For each case study, codes developed were presented in tables giving examples of the data supporting each code and the number of data sources (Chapters 4.1-4.3). Development of an explanation (Yin 2008) of the observed relationship between the codes drew on relevant, peer-reviewed literature (Kelle 2005). This process of explanation building was iterative (Yin 2008): drawing on as wide a range of theoretical sources as possible to make theoretical statements regarding causal links between codes, comparing the statements to the case study data, and revising the statements. Explanations were only selected when they offered the best explanation the researcher, with reference to existing theory, could offer for the codes and relationships between codes identified (Kelle 2005).

^a *Full list of codes is made available on CD to examiners but may not be available when the Thesis is published in Cranfield University library.*

3.2.5. Validity (credibility) and researcher bias (reflexivity)

Credibility (validity) of data gathered during interviews was established by triangulation between data sources (interviews and documents) (Yin 2008). In most instances codes were only used in the final analysis if they were strongly supported by multiple data sources (for example, table 4.1.5. in chapter 4.2.). In situations where the diversity of perspectives was relevant then a code was only included if codes describing all other perspectives were also included in the final data analysis (see example, table 4.3.5. in chapter 4.5.).

Further verification of results and mitigation of researcher bias was achieved through comparison of the results produced by member checking and peer review (O’Leary 2010; Yin 2008). For member checking, results were sent to all interviewees and feedback requested. However, because of the low response rates further feedback was sought from the group risk manager in each case study organisation. During analysis of results the researcher regularly discussed coding with his supervisors and peers. In addition a more formal peer review of coding was carried out after coding: two researchers (JD and FS) who had minimal involvement with the research, were given a sample of codes with the title and description missing. The researchers (JD and FS) were then asked to describe the codes without input from the researcher (CM). The researchers’ (JD and FS) descriptions were then compared to the primary researcher’s (CM) descriptions. If there was a disagreement, it was discussed whether the code

needed modification and the code modified accordingly (see results of peer review in appendix H). Finally, the researcher strove to be upfront and explicit about theoretical influences and his epistemological stance in the research process. Key theories that retrospectively influenced interpretation of data and results included sensemaking (Weick 1995; Maitlis 2005); schemata and mental models (Harris 1994; Plant & Stanton 2012); a constructivist and discourse based view of the firm (Taylor & Van Every 2000; Weick 1969); community of practice theory (Brown & Duguid 1991); coordination theory (Carlile 2004; Mintzberg 1979); and a knowledge based theory of the firm (Grant 1996; Jensen & Meckling 1995).

3.3. Potential methodological weaknesses

3.3.1. Little basis for generalisation

Research following a case study strategy is often criticised in terms of scientific generalisation, particularly in comparison to research following sampling logic and statistical analysis (Yin 2008; David Buchanan 2012). Multiple cases were not used in this research to alleviate this concern because the ‘sample’ number would still be statistically insignificant. The research aim and methodology were clear that the purpose of this study was not to generate data on a statistically significant sample of a larger population (Atkinson & Shaffir 1998). Instead, this research aimed to develop an in-depth account of risk management practice and the factors affecting it in two organisations that contributed to understanding of risk management pervasiveness. The core determinant of whether research can contribute to understanding of a concept is whether it develops an internally-valid and in-depth account of the

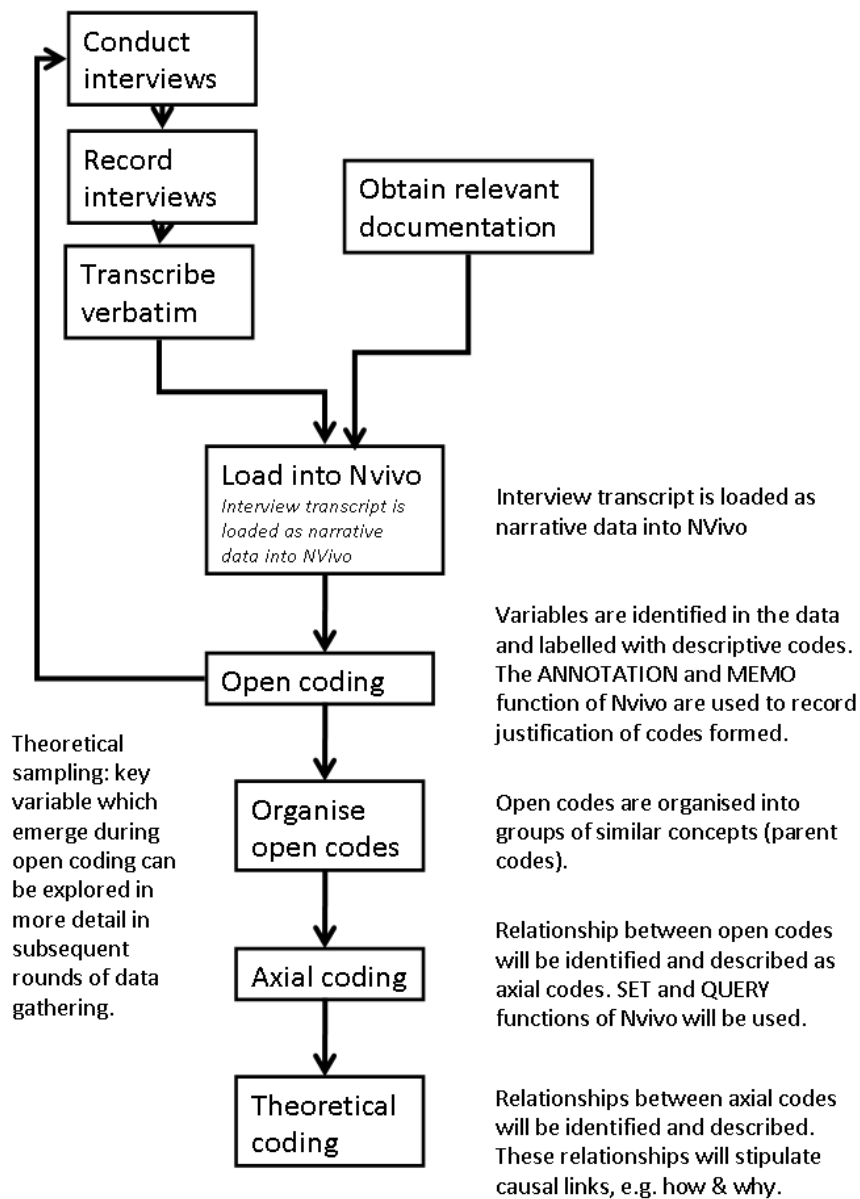
phenomena in question (Buchanan 2012; Tsoukas 2009). The main outcome of this research was then to deepen understanding of a concept (pervasive risk management) (Tsoukas 2003) relevant to the management of risk both in the public and private sectors. Thus, the primary means of generalisation beyond the cases themselves was analytical refinement, whereby the case studies expanded existing theories concerning the phenomena of interest: in this case risk management pervasiveness (Tsoukas 2009). In addition, because both a public and private sector organisation were chosen, the degree to which the findings might be generalised based on common features to other (large) organisations is increased (moderatum generalizations) (Buchanan 2012).

3.3.2. Researcher influence

The possibility that the researcher may have influenced the responses of the interviewees, for example through choice of language or even through his appearance or presence, cannot be completely removed (Labov 1971). To minimise this risk, the researcher was mindful of his choice of language and aimed to influence the interviewees as little as possible (Whyte 1982). The difficult balance to be struck was between minimal influence and encouraging the interviewee to be as forthcoming as possible. Depending on the interviewees attitude and willingness to talk the researcher adapted his interview style. Typically, in each interview the researcher covered all six levels in Whyte's (1982) directiveness scale of interview technique. The researcher tried to make interviewees as conformable and relaxed as possible. The researcher used simple language and avoided jargon in questions and conversation to avoid the interviewee viewing the researcher as an expert in risk management and modifying

their responses as a result. To further avoid this eventuality and encourage the interviewee to be candid and truthful the researcher impressed upon them he was there to ‘learn from them as the expert in managing risk in their own job’.

Figure 3.1.: The coding process used to analyse the qualitative data gathered by each round of interviews.



4. Case study results

Here the three case studies carried out and the results obtained are described.

Following the research aim (chapter 1.3) each case study investigated factors affecting risk management pervasiveness in organisations. Then, following the exploratory, abductive methodology (chapter 3.1.4.), the specific factor explored in each case study was determined by the emergent results obtained in each case. Description of the results of each case study is preceded by an introduction providing relevant background to the emergent themes and details of the precise methods applied.

4.1. Case study one description and method

Case description. Our case study organisation was a power utility, selected as a good example of a reliability seeking organisation (Vogus and Welbourne 2003). The organisation was chosen because it operates reliably in the face of significant risks that were varied, safety-critical and unpredictable. The electrical generation and distribution business in the UK was privatised and restructured in 1990. Prior to privatisation, electricity distribution was operated by 12 area electricity boards (AEBs) in England and Wales. The 12 AEBs were privatized into 12 regional electricity companies (RECs). In 2000, the Utilities Act 2000 required separate licenses for electrical generation and distribution and the distribution businesses of the RECs were renamed distribution network operators (DNOs). The case study organisation was formed from two DNOs that were purchased by a large international energy distribution and generation parent company. Prior to being merged, the two DNOs had existed for over 50 years as discrete entities covering a stable geographic

area. The current organisation deals directly with customers but is regulated by the UK office of gas and electricity markets, OFGEM. The regulator benchmarks the organisations performance against past performance and other DNOs in order to set how much the organisation can charge customers, its operating budget and required outputs, such as maintenance of the network and customer supply. Thus, the organisation must constantly consider operational, business and regulatory risks. Employees of the organisation faced serious hazards, primarily working with high voltage electricity in remote or hazardous locations, for example active mines and fireworks factories. In addition the organisation provided a critical service in the form of electricity to approximately five million people over an 80,000 mile power grid. The organisation was formed from the merger of two companies, approximately ten years ago. Prior to merger, the companies existed for over 50 years as stable entities, operating electrical networks of differing design specifications. The organisation constantly manages a wide variety of risks. For example, determining inspection and maintenance regimes for the organisation's large, dispersed and varied asset base, involves balancing asset risk, health and safety risks, financial risk, long and short term risk to customer supply and regulatory risks. Although safety issues were prominent, the case study explored the whole range of risks facing the participants interviewed.

Method. Data were gathered through 28 semi-structured interviews comprising open-ended questions, conducted between February and November 2010. Interviews were each one to two hours long, conducted in the workplace, recorded with permission and transcribed verbatim. The anonymity of interviewees and the organisation were preserved. Interviews were completed in three stages to allow theoretical sampling,

(Alasuutar et al. 2008) whereby the focus of interview questions in each round was informed by data analysis of the previous stage(s). This allowed us to focus on themes relevant to the research question as they emerged while remaining open to new variables. The three stages comprised: scoping interviews (four); first tranche of interviews (twelve) and second tranche of interviews (twelve). In each tranche, participants constituted a diagonal cross-section of the organisation, representing a broad section of hierarchical and functional divisions, from directors to project managers and front line staff. Interviewees were keen to share their views on risk management in the Department and discuss their own risk management activities.

4.2. Case study one results

The emergent theme in case study one was the role of experience in risk-based decision making and the coordination of risk management. Tables 4.1.1-4.1.7 describe the qualitative codes identified in the data. Tables include the number of participants whose data contains each code and so indicate the extent to which each code is represented in the data.

4.2.1. The use of experience

The results revealed that experience was used widely to inform risk-based decisions (Table 4.1.1.). Participants used the terms ‘judgement’ and ‘professional judgement’ to refer to knowledge drawn from their working experience. Experience was used to inform risk-based decision throughout the hierarchical levels sampled, including strategic risk assessments by directors and operational decisions by front line staff in the field (Table 4.1.1.). In fact, ‘first hand experience’ was the most common resource

used to inform risk-based decisions reported (Table 4.1.2.). Experiential knowledge was sometimes explicit; for example, the observation that the condition of a substation door and general substation maintenance were correlated (code: ‘Front line staff’ Table 4.1.1.). In other examples, experiential knowledge was tacit, resulting in judgement more akin to intuition (code: ‘Directors’ Table 4.1.1.). Second hand experience was also an important for risk-based decisions. Participants not only learned from personally experience, but also from the experience of third parties. Participants commonly reported seeking out peers or experts to learn from their experience and improve their own decisions (codes: ‘expert consultation’ and ‘colleagues’ Table 4.1.2.):

“[...] I’ve got some really experienced people working here. So you would use their judgement and use their experience to make your own judgements.”

Another key observation on the use of experience was that 27 of the 35 examples of decisions based on first hand experience drew on context specific experiences not widely held throughout the organisation. For example, the experiential knowledge could be more geographically specialised; say, a front line worker’s knowledge of the configuration and condition of the electrical hardware in the area they have worked in for many years, illustrated by the following:

“I spend most of my electrical days working the X district. But now I’m out in Y and Z. Although the variations on the theme are the same I am finding allot different electrical equipment, unfamiliar to me. And under those circumstances I need to go with someone from that district for a period of time to actually gain their skills.”

Experience could also be specific to a particular task, for example repairing damaged cables:

“...there’s written criteria if you get a fault on a cable you should be ten metres away from that damage before you put in a repair in. But if you go to that ten metre point and through the experience I have, you then can say to that Project Manager ‘well this cable is perfectly alright to put a repair on,’ or ‘go x metres further back and trying again.’ Because, at the end of the day, I don’t know [in advance] how far the soot, carbon and moisture has gone up that cable.”

Table 4.1.1.: Description and examples of the codes relating to use of experience throughout the case study organisation’s hierarchy. The column ‘n’ indicates the number of respondents whose transcript contains the respective code.

Code	Hierarchal divisions	Illustrative examples	n
<p>use of experience throughout the hierarchy</p> <p><i>Judgement drawing on experience and intuition is used by individuals to enact risk management policy, rules and procedure in real life situations. This is true throughout the organisation, concerning risks from operational to strategic.</i></p>	Front line staff	<p>“As I go into an unknown substation I notice things. Things like the type of lock that on the door, whether its a modern lock or an old lock. You can assume to a degree that because they have painted those doors that they have got a key to it, that it’s been maintained. If you approach a set of doors and they are all rotten and a guy turned round and said ‘oh I thought you looked after this, I never had a key to this’ then you automatically ratchet up your senses. I can do that based on experience from the five years as an apprentice with tradesmen.”</p> <p>“Yes you do use your own judgement on things that go beyond those [rules and procedures]. You might go somewhere and the gates are locked and it looks as it should, that’s one of the procedures to look for. But around the corner where your list of things doesn’t check, there might be something that you’ve spotted there that might not be quite right. So you might have to look there first, to see dangers.”</p>	5
	Middle management and engineers	<p>“But the recognition is, when you’re out there at the 3 o’clock in the morning, life’s not like that [the text book example], and so with training and experience etc, you try get the right behaviours and values. To actually have some more binding philosophies or values which actually allow people to make judgements on views on risk in a consistent way, recognising that you can’t stipulate every single thing that’s going to crop up.”</p> <p>“I’ve got the Network Design Manual that obviously takes that in to account. But because of the variance of the jobs you’re then reliant on the design engineer having the competence to actually interpret that and apply it to the realistic job solution. You’ve got the basics there to work on but then you rely on individual judgement to then apply it to the site specific stuff.”</p>	6
	Senior management	<p>“So you might get quantification. But at the moment I am more into judgements and I do that by going out to talk to people in the field and our project managers, linesman, jointers who are actually touching these assets and getting some feedback from them and asking for evidence of their concerns.”</p> <p>“...when I do the [asset risk] assessment which is semi-quantitative, I take the qualities of stuff and I make it a quantitative by judgement.”</p>	5
	Directors	<p>“One is qualitative data. I am a very data heavy organisation. Secondly, there is a lot of skill and expertise out there. And then a lot of it, it still is a gut feeling about if something’s not in the top 5 [risks] because the mechanics of the calculation, probability times, whatever, you’re just thinking ‘well that doesn’t feel right’.”</p> <p>“It’s high. A lot of judgement. It’s good, because I’ve had risk processes in the past which have been so driven by spread sheets. Especially the high-impact, low-probability ones, never appear, so they just never appear anywhere when you do it using expected values, and those are the ones that really do come and hit you.”</p>	2

Table 4.1.2.: Descriptions and examples of the open codes relating to the resources actors use to aid risk-based decision making. *The column ‘n’ indicates the number of respondents whose transcript contains the respective code.*

Code	Description of resource used to aid risk-based decision making	Illustrative example	n
Risk Management tools	Risk management tools, such as ALARP or other heuristic decision making tools.	“I think, one of the models is the HSE ALARP principles, all those sorts of models, are at the fundamental part of it.”	2
Industry best practice	Codified industry standards.	“Design based on codes of practice, standard applications, standard plans, and you would look at standard protection scenarios.”	2
Data	Qualitative or quantitative data on impacts and probabilities.	“One is qualitative data. I am a very data heavy organisation.”	3
Colleagues’ experience	Respondent relied on the experience of peers in the work place.	“A lot of it is down to the experience of the people that you’re with. As to any risk really, any of the risks. You might be the most experienced person there, but you can miss something obvious that one of the apprentices picks up on.”	7
Superiors	Decision is escalated to more senior actors.	“If I felt through my own experience and the people I’m working with, their experience, that this risk was beyond our control, then I’d go higher up.”	8
Codified rules	Official rules and procedures rendered in text.	“You’ve got your power systems ops manual and you’ve got your distribution safety rules. They’re your bibles along with your jointing instructions what’s come with every joint. They’re the pieces of paper that you’ve got to follow.”	8
Expert consultation	Judgement of actor, perceived to have greater knowledge and experience.	“There is a lot of skill and expertise out there, so it’s talking to the people who may be closer to understanding.”	10
Individual experience	Respondent relies on their own experience in decision making.	“I would probably be a little bit more vigilant when I am going into the customer ones, because I know from experience that they will probably have been neglected from a safety point of view.”	11

4.2.2. Experience and risk decision complexity

By observing the context of risk-based decisions (Table 4.1.3.) in relation to the resource used to inform the decision, insight is gained into the different roles those resources play. The use of first and second hand experience in decision making tended to coincide with complex risk decisions, situations not covered by codified rules and decision made under time pressure (Table 4.1.4.).

The complexity observed in association with the use of experience was typified by uncertainty and ignorance (Stirling 1998) (Table 4.1.5.). For example, complexity

arose from a work environment distributed over a wide geographic area, including urban, rural, industrial and post industrial settings and technology of varied design and age. Therefore, few risk-based decisions were routine and involved an unknown element, for example, asset condition or novel combinations of older and newer technology. This, coupled with direct contact with customers, meant that routine responses and general rules were not always appropriate or sufficient, requiring employees to make decisions drawing on experience (Table 4.1.5.).

The involvement of multiple risks further increased the complexity of decisions (code: ‘multiple risk categories’ Table 4.1.3.). For example, dealing with customer complaints may require balancing the risk to reputation against financial risk, while also considering the regulatory risks of setting precedents or not meeting regulatory minimums. The organisation’s explicit risk appetite and espoused values (Schein 1986) typically considered risks in isolation, requiring employees to decide how to address trade-offs between multiple risks. For example, the organisation’s dedication and clear value to never compromise safety, created a dilemma for decision makers in an environment where some residual safety risk was unavoidable if business objectives were to be met. To overcome this, participants relied on their own values and experience to translate an uncompromising commitment to safety into a practicable action. The author does not suggest such a strong commitment to safety is not highly desirable. Rather, it is emphasised that the importance of employees’ decisions, drawing on their expertise, to enact that commitment into practicable, real-world action, illustrated by the following:

“I’ll use the snow as a good example. I’ve got over a thousand commercial vehicles and they’re out throughout the whole of our organisation’s patch. So I had all of that snow. The safest thing would’ve been to tell everybody to stay at home, would’ve been reduced chance of any kind of road traffic accident, personal injury, third party injury. You’ll have no safety events at work today but I won’t be there, you won’t have a business. I’m sure my boss would’ve said “Yes it’s all very good but after a while you’re not going to get paid because actually I’m paying you to come to work.” So I’ve got to do work and I’ve got to do it as safety as possible and it’s then down to leaders like me, people who report to me to set the values and to stand by them. So is safety a priority? I think it comes down to the values set of the managers.”

Table 4.1.3.: Descriptions and examples of the codes relating to the context within which risk-based decisions were taken. The column ‘n’ indicates the number of respondents whose transcript contains the respective code.

Code	Description of risk-based decision context	Illustrative example	n
High time pressure	The decision maker is under high time pressure.	“When it was getting down to sort of time constraints.”	6
Beyond experience	The decision maker does not have experience of this risk.	“If it’s a risk that you’re not common with or you don’t know that well.”	4
Conflict between rules and expertise	The decision maker’s judgement conflicts with the codified rules on a risk.	“... a way of stripping cables. And in our rule book, that’s the wrong word. In the jointing procedure it says you can flame torch it and take it off with a flat bladed knife and personally that’s more dangerous in my mind than using the tool that can’t cut you physically whereas a sharp knife can.”	4
Risk is predictable and well known	The risk is stable and well known, uncertainty is low.	“We’re not innovative, leading-edge technology type selling or stuff like this. So the risks I have do stay relatively constant.”	4
Complex risk decision	The risk decision occurs in varied and unpredictable contexts.	“No two joints alike. And it’s totally different doing a joint on a bench and a joint hole filled with water. And it’s even worse when you come to do it at night when you’re working with artificial light and you get all these shadows and all that sort of business.” “... whereas I have no idea; kids jump into substations, whatever. I have no idea. I can’t control 94,000 substations.”	11
Risk is not covered by codified rules	The particular risk or its context is not adequately covered by codified rules or procedures.	“I would say the rules don’t cover it because there are certain – when I mainly identify these sort of risks on sort of standby, when it’s at night and it’s a fault situation and it’s completely different to like a text book scenario basically.” “And the rules aren’t very – they’re perfectly written out to meet standards, but they don’t really cover – there was one particular thing that didn’t really work out very well.”	7
Multiple risk categories	The decision involves multiple risk categories, for example reputation, financial and regulatory.	“The, the primary driver on this is safety. Although financial impact has got to be taken into account. And all the time I’ve got to take the Euro successive law so far as is reasonably practicable.”	10

Table 4.1.4.: Overlap between codes suggesting relationships between resources used to inform risk-based decision making and decision context. *The number in each column and row intersection indicates the number of data sources (interview transcripts) in which the codes overlap (the number in brackets is the total number of times the codes overlap within those data sources). The strongest relationships between codes are shown in bold numbers.*

Resource used to support risk-based decision:	Context of risk-based decision:					
	Beyond experience <i>The decision maker does not have experience of this risk</i>	Conflict between rules and judgement <i>The decision maker's judgement conflicts with the codified rules on a risk</i>	Time pressure <i>The decision maker is under time pressure</i>	Multiple risks <i>The decision involves multiple risk categories</i>	Risk is not covered by codified rules <i>The risk or its context is not adequately covered by codified rules or procedures</i>	Complex risk decision <i>The risk decision occurs in varied and unpredictable contexts</i>
Colleagues, the experience of peers in the work place	2(10)	0	1(7)	0	1(4)	0
Data, qualitative or quantitative data on risk	0	0	0	0	0	1(5)
Superiors, decision is escalated to more senior actors	2(8)	3(11)	1(7)	0	3(11)	1(4)
Expert consultation, judgement of actor thought to be an expert	3(11)	0	1(7)	0	3(12)	1(6)
Individual experience, respondent relies on own experiences	1(5)	1(5)	5(10)	2(10)	6(16)	4(14)
Industry standards, codified industry standards	0	0	0	0	0	1(5)
Risk management tools, heuristic decision making such as ALARP	0	0	0	0	0	0
Rules, codified official rules and procedures	1(7)	3(12)	0	0	0	0

Table 4.1.5.: Description and examples of the code ‘Risk management complexity necessitates judgement’. The column ‘number of respondents’ indicates the number of respondents whose transcript contains the respective code.

Code	Description	Illustrative example	n
Risk management complexity necessitates judgement.	The acceptability of a particular hazard and the appropriate mitigation depend on the context, which can be highly variable. Therefore risk management behaviour is accordingly flexible and varied. This makes it difficult to create standard rules and procedures to manage risk, therefore judgement must be relied upon.	<p>“Whereas on the East you would only have 132 to 33 and a 33 to 11 with one bar coming off it. So there’s lots of resilience in the East network by design...The West network tends to be quite a lot higher, higher loaded as a default. So when you have another outage or a fault it puts even more strain on the equipment that’s left there. So you’ve got to – even your risk – what, if you want to come up with a single formula, you can’t really do that either. It’s got to be really based on what you know, what the network and how it’s designed.”</p> <p>“Two transformers, for example within generation, you could quantify that risk quite easily, in terms of its probability and severity, in a certain situation. But then apply that into a group of transformers for which there maybe 200 transformers of a similar type within central networks, each one of those 200 being located in different proximities, or different circumstances - different connectivity models. How – the difficulty comes in how do you actually – how do you capture the risk, if you like?”</p> <p>“And particularly once again in services the variability of what’s going to happen is, the variability is huge. And you have to be able to make a sensible interpretation on the spot as to what you are going to do. You know, in a factory you can control most of the conditions. You know, hotel, if your’ dealing with people in any shape or form, in a restaurant, airline passengers or whatever, then it’s different, so if your’ dealing with people it’s different. And if you’re dealing with the variability in the environment that I have to deal with its different too.”</p> <p>“The problem that you’ve got is you can set that plan in place a fair distance in front of you, as you approach the time and you get closer and closer you’ve got to start looking at what faults you’ve got in the network, because they may not have been there at the time I did the initial planning. So, so the risk itself, there’s no magic formula. It’s got to be based on the circumstances that you’re presented with operationally more often than not.”</p>	13

4.2.3. Respect for experience

Individuals in the power utility constantly used their experience to query formal rules and procedures, for example questioning whether the formal procedure for stripping wires was the safest. However, when this resulted in a conflict between the decision maker's judgement and codified rules, the effect was not 'rule breaking'. Rather, decision makers tended to follow the rule if the consequences were minor (for example if the task might take longer) and refer the problem to a superior if the consequences were significant (if there was a risk of injury or significant reputational damage) (Table 4). If referred to a superior, then following dialogue (Shotter 1993) between operational and managerial employees a rule or procedures might be upheld or altered to reflect the initial judgement. Such bottom up feedback, drawing on employee experience, was welcomed and taken seriously throughout the organisation. For example, employees were not expected to follow rules if they thought doing so was unacceptably risky:

“But obviously that’s the whole idea of doing this risk assessment so that you apply the rules and in doing that risk assessment if there’s a problem with applying those rules to that particular site. Then you feed that back and you say “Well actually I can’t apply that rule.” And you get some agreement in how you would progress.”

Experiential knowledge also informed the development of rules and procedures. For example, new site management guidelines, based on industry standards, were substantially modified after feedback from managers experienced with such sites. In

this case, the first draft guidelines, while meeting all regulatory requirements, were deemed impracticable by the managers experienced with site management:

“I’ve recently written our contractor safety and engagement policy. But it was totally focussed on building a power station which I don’t do. So the idea of having a fence all around the site, inducting contractors to work on each site, each site having a site owner, which the policy asks for, I cannot do. If I turn up to work on your house I’m sure the neighbours wouldn’t want us to put a fence all around your street and have some chap stood there with the yellow hat saying “You’ve got to sign in.” And, that’s the problem, I’ve got a retail business, I’ve got a generation business, I’ve got the home, and I’ve got a wires business. And they’re totally different. So then it landed with me to review: I said “This cannot work in [XXXX].” So the compromise was a [XXXX] Arrangements Document which says ‘I recognise the policy but within [XXXX] this is how I will discharge the policy.’”

Behind this extensive and open use of experiential knowledge was a widespread respect for experience (code: ‘Respect for experience’ Table 6), defined as recognition that the experience of others may be of value to one’s own decision making. For example, respect for experience is expressed by the willingness of a manager to delegate a decision to a more experienced but junior colleague (Table 6). Respect for experience encouraged individuals to consult others who they perceived to have relevant experience and legitimised experiential knowledge as a valid form of knowledge to inform risk based decisions. Thus, respect for experienced encouraged communication of risk relevant knowledge and the incorporation of experiential knowledge into rules and procedures. In contrast, when participants did not feel like

their expertise was valued or reflected in rules or procedures, there was a degree of resistance to compliance. For example, an operational employee judged procedures for conducting risk assessments as inefficient and as a result treated it as a ‘tick box’ exercise:

“For example I can understand the procedure where you have to have risk assessments and they have to be recorded. But for us to record the same thing every day for six months, to me and to a lot of people, seems sort of “Why?” [...] But we’re doing this and it turns out, well it does it ends up that you’re just writing one down just for the sake of it, because you’ve got to in case somebody turns up [...] I’m not saying I don’t work safe and I don’t pick the hazards out. But that bit of paper doesn’t sort of do anything to make us any safer.”

In summary, respect for experience was a widely shared value amongst participants that encouraged the sharing and use of experiential knowledge. This helped ensure that rules and procedures reflected operational realities and that when they did not, operational and managerial staff could work together to come to a solution. Thus, it helped avoid issues of compliance because operational employees perceived rules and procedures as ineffective or inefficient ways to manage risk.

Table 4.1.6.: Descriptions and examples of codes relating to the relationship between experience and risk-based decision making. *The column ‘n’ indicates the number of respondents whose transcript contains the respective code.*

Code	Description	Illustrative example	n
Respect for experience	The participant describes language or behaviour recognising that the experience of others is of value to risk-based decision making, particularly examples of one actor actively seeking it and learning from the experience of another.	<p>“EDS or a Project Manager [...] they rely on your judgement. Generally what happens is [if the project manager is inexperienced] he relies on myself as having 28 years of experience to his 2½. So yes he might have been my boss but he also listens to what I have to say and he’s developing from that as well.”</p> <p>“I would expect is that if they haven’t got certain types of experience that they have counselled somebody who has got that knowledge.”</p>	12
Importance of shared experience for communication	Relevant experience of the line manager facilitates sharing of experiential knowledge between line manager and operational employee.	<p>“No disrespect but you get a manager that’s a manager, but they’ve got no coal face experience. The other way you get a manager that has experience and been promoted to his position. So it’s allot easier to talk sense to this guy.”</p> <p>“Yes, the more remote the manager is from the task the more difficult it becomes to have him fully understand your decision that was made.”</p>	10
	Experienced line managers’ ability to understand subordinate’s decisions improved subordinates’ confidence in decisions.	<p>“If they [line manager] are giving you the authority to do it, that they understand the authority that they’re actually giving you and it sort of slightly boosts your confidence in thinking ‘Well they know what they’re on about. They trusted me to do it.’ So it sort of increases your own judgement and it makes you feel more independent, as it were.”</p>	

4.2.4. Shared experience, communication and coordination

In addition to respect for experience, having some degree of shared experience was also important for communication (code: 'Importance of shared experience for communication' Table 4.1.6). Where operational staff and line managers had some relevant shared experience, their ability to communicate with each other, and confidence in each other's judgement, was increased. Experienced line managers used their understanding of the decisions faced by front line staff to reinforce 'good' decisions through positive feedback. While operational staff felt that experienced line managers were better able to understand their decisions and thus gained confidence in their own expertise when experienced line managers endorsed their decisions. Conversely, if line managers lacked relevant experience, participants felt they were unable to communicate fully their decisions and this undermined their confidence (code: 'Importance of shared experience for communication' Table 4.1.6).

Where communication was limited or ineffective, a lack of coordination between individuals and groups within the organisation was observed (Table 4.1.7). Most often, ineffective communication lead to a lack of coordination between employees with an operational focus and those with a more strategic focus, for example a focus on commercial or regulatory issues (Table 4.1.7). Lack of coordination did not take the form of systematic rule breaking but rather a lack of understanding and engagement between coordinating parties. For example, operational staff felt that some managers with a commercial or regulatory focus did not understanding the rationale behind some operational risk management practices:

“[...] with some of the things I do at operational level its pretty clear cut. I think there’s perhaps some misunderstanding from a commercial regulatory aspect as to why I do certain things. So at the moment a lot of people are doing things but probably they don’t know the reason, the full reasons why they’re doing it. So at the moment I would think in certain areas of the company it could be questioned “Why do I do this long way of doing it when I could just do that?” And they don’t know the reasons or the other knock on effects if I don’t do it sort of thing and the full reasons why I do it in a certain way.”

In summary, shared experience was important for communication across the organisational hierarchy. With shared experience, employees were able to communicate more effectively, make joint decisions and mutually coordinate their practices. However, where communication was limited, coordination across hierarchal divisions began to break down. For example, failure to communicate the benefits of strategic asset risk assessment lead to a lack of engagement by the business units required to report asset condition, reducing the quality of data available to the strategic risk assessment (Table 4.1.7).

Table 4.1.7.: Descriptions and examples of codes relating to the relationship between coordination and communication. *The column ‘n’ indicates the number of respondents whose transcript contains the respective code.*

Code	Description	Illustrative example	n
Lack of coordination and communication	Lack of coordination between individuals and groups within the case study that is related to ineffective communication.	<p>“Network strategy may go and ask some of the businesses for some support for collecting data and evidence [for an asset risk register]. And some of the other businesses will say “That’s not my responsibility, that’s your responsibility.” And support is not as good as it could be.[...] So from the local level when they’re getting the input they’re not seeing any actions as a result. It seems, the process seems to be too slow. Now I understand they [network strategy] are looking at risk management strategy for the next 5/10 or even 20 years time. So the [asset risk register] project I suppose what they should say to business units is they need to (a) sell the merits of what they’re doing and successes at an early stage and possibly go out in the business for quick wins. So the people who are providing the information actually see something happening. And I think that’s one of the failings of the AERO project.”</p> <p>“So you’re always going to have in this type of business and this industry you’re going to always have to have policies and procedures which is absolutely the right thing to do. The one problem with that is then being able to communicate the information held within them policies to the masses so they can understand and follow the procedures. If I’m honest I don’t think that’s something We’re so good at. I tend to communicate too much by email, I communicate too much by operational bulletin – that relies on an individual reading it, then understanding. I think from an organisation I don’t put enough time and effort into holding proper briefings, proper training sessions and potentially questioning and challenging the individual about their level of understanding. A lot of that relies upon the people who know the activity, who know it probably better than others which might be people like authorising officers or very experienced engineers then actually portraying that through a buddy system – I’ll show you how to do it, I know how to do it so I’ll show you.”</p>	9

4.2.5. Declining experience

Four participants expressed concerns about diminishing experience in the organisation which they attributed to declining opportunities to learn from peers. For example, loss of social spaces where staff could share experiences and increasing preference for classroom training over apprenticeships, illustrated by the following:

“I don't think they are giving these people enough time with the more experienced tradesmen, because you can learn allot more by sometimes watching a qualified tradesman's approach.”

Others perceived that because older, more experience staff were leaving the organisation and not being replaced, a source of experience was being lost, illustrated by the following:

“I was fortunate to come through with all these mature engineers who were very knowledgeable, very practical but they also had the technical competencies. They were allowed to leave almost on block and as a result I almost became a very young workforce. And all that experience then fell on just a few heads and shoulders. And the danger is that I've actually, most of us have gone into management roles so I don't find enough time to get out into the field to pass on the experience in the practical, real world... I think it's had certainly an impact when you look at the operational incidents within the business...”

4.3. Case study two description and method

Case study two description.

Regulatory and political context

The Government handling of public risk has been a major focus of political and public sector reform in the United Kingdom (UK) since the early 1990s. Risk management, is now a central role of the State that it shares with other parties (risk generators, the insurance sector, citizens, trade bodies, companies). It is a key means of managing risks to and from the environment, including high profile and emotive risks such as Bovine spongiform encephalopathy (BSE), terrorism and nuclear energy. UK government guidelines on risk management (OGC Office of Government Commerce 2007; HM Treasury 2009) are heavily influenced by the COSO (2004) ERM model, retaining the emphasis on risks to strategic objectives, risk appetite and internal control. Adaptations to the specific requirements of risk management in the public sector include (i) sharing the responsibilities and costs for risk management with parties beyond the State; (ii) the distinction between strategic, policy development and policy delivery risks; and (iii) ensuring the regulation of risk is transparent, proportionate and targeted to where it can have most effect (OGC Office of Government Commerce 2007; HM Treasury 2009)

The case study organisation

The case study was carried out within a UK central government department responsible for managing a number of risks, including risks of strategic importance to the UK. The Department has considerable expertise in risk assessment and

management of a number of primary risks (Michael Power 2004). The Department's management of primary risk involves identifying and assessing hazards, exposure routes and vulnerability, both quantitatively and qualitatively, as well as concern assessments (risk perceptions, social concerns, socio-economic impacts). Drawing on this expertise the Department has produced generalised guidelines on risk management of certain primary risks and plays an active role guiding international and national legislation and regulations.

Risk governance structure of the case study Department

The Department's strategic approach to risk management follows ERM (COSO 2004) principles defining risk as threats to departmental objectives. An added complication of ERM in the public sector emerges here: the Department is vertically integrated with other governmental bodies. Therefore the department's risk management must take into account the, potentially differing, objectives of these other organisations when considering, for example, reputational risks. This is often politically sensitive and is not managed explicitly.

Delivery of policy in the Department is achieved through a mixture of programmes, projects and ongoing activities, which are differentiated on the basis of risk.

Programmes are bodies of work to deliver a specific policy outcome, often of strategic importance, and their governance and reporting arrangements reflect their higher risk status. The programme and project management (PPM) processes used typically require regular reporting of risks to programme boards. Projects are less high profile bodies of work delivering predefined outputs contributing to a programme or for example, delivering a new IT system. Projects receive accordingly less governance oversight. Ongoing activities refers to every-day work with no fixed endpoint or

outcome. Ongoing activities typically received little high level oversight. The strategic contribution of each activity type is communicated and monitored through portfolio management tools, showing how this contribution is woven into policy work at lower levels in the department.

The policy cycle

At the heart of the Department's function is the policy cycle, which guides how policy is designed, developed and delivered. The Department's risk management policy states that risks should permeating the entire policy cycle rather than being restricted to, for example, an appraisal of the risks of a final set of policy options. In the early stages of the cycle, a main concern is in building an appropriate evidence base, including probabilities and consequences of any risks, to support the identification and comparison of policy options. Moving on to policy appraisal, guidance on the analysis of the risks for policy options exists in HM Treasury's 'Green Book' on economic appraisal in Government ("The Green Book: appraisal and evaluation in central government," 2013). Here, the emphasis is on supporting the cost-benefit analysis and (policy) impact assessments that guide the selection of an optimal policy design. Risk is viewed in terms of the uncertainty associated with cost-benefit data. In the later stages of the cycle the focus shifts to delivery risks: to managing those hazards that may disrupt achieving policy objectives. At this point the Department asks its Ministers to consider the options for translating policy goals into deliverable solutions through regulations and incentives. One of the Department's general risk management goals is to make good, risk-informed decisions, and so these Ministerial submissions on policy intervention must be backed by impact assessments that present risk trade-offs and balances that Ministers and senior managers can

consider. The policy cycle also contains a series of approval ‘gates’ (decision points) that must be navigated before a proposed activity can proceed to the next stage. These gates operate at the central or lower levels, depending on the nature of the proposed policy and the amount of new investment required. They involve challenge and scrutiny of policy by senior managers, supported by a team of reviewers. Approval gates generally only apply to high profile and new programmes and projects as they move through the policy cycle, however, if an on-going function requires additional funding approval must be sought. Finally, after policy is delivered its efficacy should be assessed in order to promote learning and improve future policy development and risk management therein.

Case study two method. Case study two in a central government department developed two distinct dimensions. Dimension one concerned knowledge sharing and sources of knowledge informing risk management (chapter 4.4.); and dimension two concerned the effect of shared perceptions of risk management on risk management practice (chapter 4.5.). After initial open coding (Figure 3.1.) each dimension was coded and analysed separately in order to fully develop each dimension. Further, an additional 23 interviews carried out in the same central government department by another researcher (FS) were used to supplement the results regarding dimension one (chapter 4.4.).

The case study data comprised (a) semi-structured interviews, (n = 22) between February and June 2011; and (b) document analysis. Interviews lasted one hour, comprised twenty five open-ended questions and were conducted in private. Questions focused on risk management practice and decision making. Participants’

identity was made anonymous in data analysis and use. Interviewees were selected from policy teams, identified by the Department's policy cycle as a key area where risk management was embedded in policy-making. Eight policy teams were selected to be as representative as possible and included small and large teams; teams working on new and older policy areas; and teams working on high and lower profile policies. Each policy team leader and one to three subordinates (depending on policy team size which ranged from three to over ten) were interviewed. Details on interviews roles and policy areas can be found in appendix K. Interviewees were keen to share their views on risk management in the Department and discuss their own risk management activities. Documents used were internal reports and policy documents, including reports on prior research on risk management commissioned by the department.

The additional data incorporated into dimension one (chapter 4.4.) derived from 23 semi structured interviews were carried out between August 2009 and March 2010. These interviews were carried out by FS and followed a similar interview protocol: lasted one hour, were conducted one to one in private and participants' identity was made anonymous in data analysis and use. In contrast to the core 22 interviews conducted by CM, the interviews (carried out by FS) sought to capture a broad sample of individuals from a range of functional groups and hierarchical levels including specialist advisors to policy teams. Interviews carried out by CM and FS did not overlap in terms of individuals or policy teams.

4.4. Case study two – dimension one: sharing knowledge

One theme in case study two was the role of informal communication in risk management. Results relating to this these are presented in this chapter. Tables 4.2.1-4.2.3. describe the qualitative codes identified in the data. Tables include the number of participants whose data contains each code and so indicate the extent to which each code is represented in the data.

4.4.1. Risk-based decisions

Policy teams were responsible for risk-based decisions at project and operational levels and for informing risk-based decisions at programme and strategic levels (Figure 4.2.1.). Policy teams typically comprised two to ten individuals lead by a middle ranking civil servant, for example a project manager, who did not report directly to the board. Each policy team was responsible for one stream of work within a policy area overseen by a senior civil servant (senior responsible owner) who reported directly to the board. Integration of risk into policy development at all levels was codified by the department's 'policy cycle' (Figure 4.2.2.) which identified the appropriate risk management activities at each stage of policy-making. The following risk management activities were largely delegated to policy teams: identifying and assessing risks associated with policy options, managing delivery risks and evaluating the efficacy of the risk management of delivered policies. Thus, policy teams were responsible for identifying policy risks and managing delivery risks. Policy risks related to the policy objectives, for example ensuring levels of nitrate in ground water meet European Union directives, and were used to inform selection of policy options by senior decision makers (strategic and programme decisions). Delivery risks were defined as risks to the successful implementation of chosen policy options, for

example risks relating to ability to deliver project goals; delivery bodies' capability to enforce policy; and secondary risks (Power et al. 2009), such as public and media responses to policies. In chapters 4.2.3.2 and 4.5.3. I describe the knowledge sources used to inform risk-based decisions taken by policy teams.

Figure 4.2.1.: The hierarchy of risk-based decisions that underpins the risk governance structure of the case study, adapted from *The Strategy Unit (2002)*.

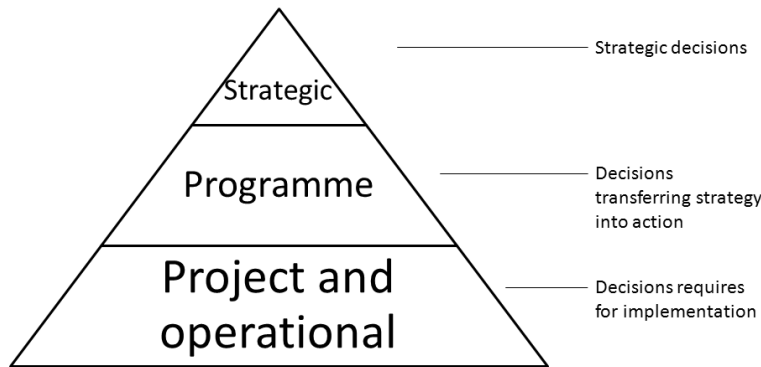
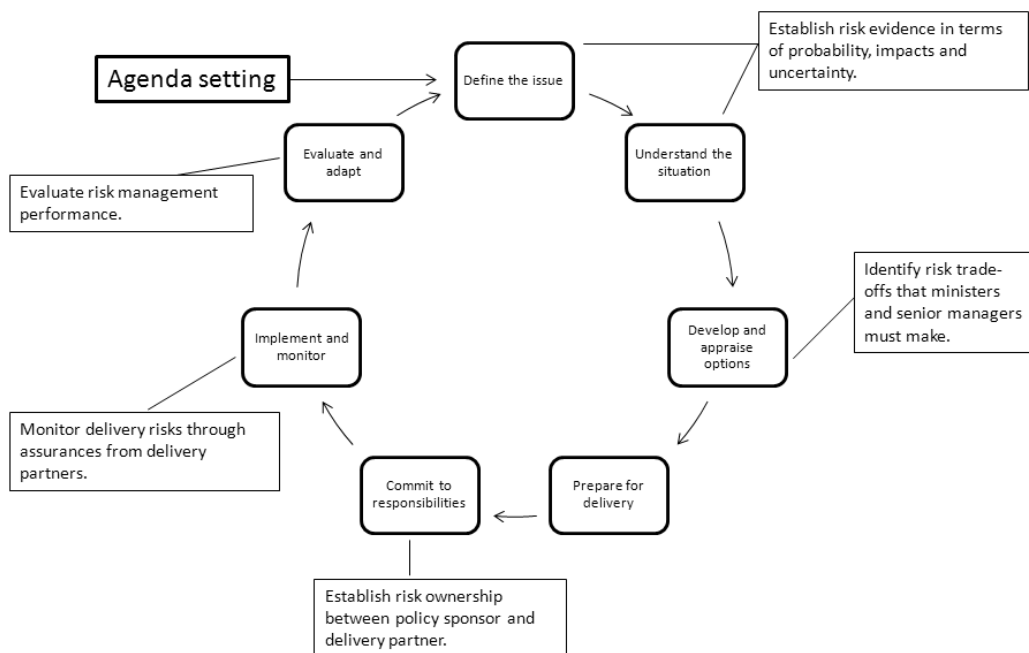


Figure 4.2.2.: The policy cycle which describes the process of policy development in the case study department.



4.4.2. Knowledge sources

The most mentioned source of knowledge informing risk-based decisions was individual experience (Table 4.2.1., code: individual experience). Other sources of knowledge included; external stakeholders, other policy teams, specialist advisors and delivery bodies (Table 4.2.1.). External stakeholders included: civil society groups, regulated industries, non-governmental organisations, pressure groups, media and any affected parties. Communication between policy teams was predominantly informal (Table 4.2.1., code: informal communication between policy teams). Communication with external stakeholders was both formal and informal (Table 4.2.1.) and often complex, involving negotiation, conflict resolution, and issue formulation, as illustrated by the following quote:

“I've been having two, three meetings in the past month and every month the [regulated industry representative] don't agree, or somebody else doesn't agree with the findings that the [delivery body] have come up with. So at the last meeting I invited an expert in [XXXX]. And [regulated industry representative] are perfectly happy because he suggested 'Let's go back and let's find out if it's 1 milligram or 2 milligram'. So to find solutions I do involve other people who need to be at the meeting. I call them in.”

Formal mechanisms for lateral knowledge transfer between policy teams, such as written reports of lessons learned, were viewed as important by only five (out of 45) interviewees (Table 4.2.1., code: codified lessons learned). Interviewees primarily

mentioned formal process of transferring knowledge between policy teams to highlight their paucity (Table 4.2.3., code: lack of formal knowledge sharing).

Table 4.2.1.: Sources of knowledge used to inform sub-strategic risk-based decisions in a central government department.

Source of knowledge used to inform risk management	Description	Illustrative example	Number of sources
Individual experience	The participant describes relying on experience to inform risk-based decisions.	<p>“The longer you’re in a department, the more you realise, and you can work from experience, in terms of what does and doesn’t work.”</p> <p>“[...] someone has not had experience of working in the delivery front end working in Government, at times the way they approach problems and solutions is not the best way. I think you do need to have that breadth of experience from knowing in reality ‘this is what happens’, ‘this is how people will operate and this is how they move’.”</p>	23
External stakeholders (lateral knowledge transfer)	The participant describes communication with individuals or groups from outside their organisation informing risk-based decisions.	<p>“Your understanding of the risk has to be informed by your dialogue with them [stakeholders] about what could go wrong,”</p> <p>“So they [stakeholders] bring out their own risks and those get discussed at the table and to mitigate them actions are taken...”</p>	15
Informal communication between policy teams (lateral knowledge transfer)	The participant describes informal communication with members of other policy teams informing their risk-based decisions.	<p>“It’s important having the right network of contacts, knowing who the people are to talk to throughout the department. There’s no, as far as I’m aware, sharing of risk experience that goes on other than informally.”</p> <p>“[...] I do work a lot with other policy teams and I do get a lot of feedback from them on successes.”</p>	6
Specialist advisors (lateral knowledge transfer)	The participant describes communication with specialist advisors within their organisations informing their risk-based decisions.	<p>“[...] sometimes that’s legal risks actually so you do talk to the legal team.”</p> <p>“[...] you are required to bring the experts on board.”</p>	6
Delivery body*	The participant describes communication with members of a delivery body informing their risk-based decisions.	<p>“[The delivery body] being our agency, I’ve a lot of trust in them [...] they go on the ground and make checks.”</p> <p>“[...] a lot of what I do has implications for service delivery partners. So I would tend to try and get them on to the project board.”</p>	6
Codified lessons learned	The participant describes formal reports of part risk management practice informing their risk-based decisions.	<p>“You can’t forget the lessons you learn from a [crisis]. Whenever I do have a [crisis] I learn lessons from it, I do lessons learned reports and see what went well, what went badly and try and learn.”</p> <p>“I think a lot of people who’ve worked on things that have been quite high profile, whether they’ve gone well or not well there will be lessons learned, logs or documents or things in some types.”</p>	5

* Government agency responsible for implementing policy developed in case study department.

4.4.3. Factors promoting and limiting knowledge transfer

A widespread ‘culture of collaboration’ (Table 4.2.2, code: Culture of collaboration) placed normative pressure on policy makers to utilise knowledge the knowledge of peers and stakeholders in policy-making. The culture of collaboration was evident in espoused values (Schein 1986) expressed by participants portraying an inclusive, collaborative approach to risk management as desirable:

“There is expertise and you know if you don’t use it then it’s silly. And you are required to bring the experts on board. Even to the extent where you’re encouraged if someone else has done something very similar to you go and have a chat with them, see what problems arose.”

Although formal mechanisms in place to transfer knowledge on risk, such as requirements to report risks or centralised risk registers, primarily functioned to aggregate knowledge for senior decision makers, I observed that risk registers also indirectly facilitated knowledge transfer within policy teams (Table 4.2.2, code: risk registers and team communication). Risk registers achieved this by requiring policy makers to make their knowledge of risks explicit and visible to others. However, only seven of the twelve policy teams interviewed currently used a risk register. Participants described increased participation within policy teams due to risk knowledge being made more explicit:

“I have a nice up to date risk register. So I’ve got the benefit of the entire team being aware of these risks, being able to update from their various areas, and to keep an eye on these risks. Whereas if you have a less well organised system you’re essentially relying on possibly just the one individual, presumably a bit higher up, who’ll be aware of it and is keeping an eye on things.”

The most widely reported factor limiting knowledge transfer was lack of formal processes and mechanisms to capture and disseminate knowledge, particularly the knowledge of employees when they changed roles or left the organisations (Table 4.2.3, codes: lack of knowledge retention; lack of formal knowledge sharing). The context specific knowledge of risks in a policy area, such as in-depth knowledge of how best to engage with key stakeholders, was felt to be particularly prone to being lost through staff turnover:

“The corporate memory seems to consist of people working there currently and how long they’ve been there, rather than actually, you know, further back, and learning from other policy areas I wouldn’t say happens much at all, certainly not at my level.”

This problem was seen to be accentuated by human resources management practices that encouraged rapid rotation between roles;

“We’re moving away from the situation where people got to know their subject areas

and were familiar with them, to a culture where we're going to dip in and out of projects much more frequently. So there's a big risk as people move from one project to another, you don't actually capture the experience they gain, before they move on."

Participants reported that lack of resources limited their ability to transfer and utilise knowledge. This included lack of financial resources and of time (Table 4.2.3, codes: lack of human capital; lack of time). For example, limited financial resources sometimes meant that participants could not consult with stakeholders or scientific experts as much as they liked. Five interviewees cited lack of time and resources as the main reason that evaluations of risk management performance were not carried out:

"...because resource and money are always a problem, I suspect that when you get to that part of the cycle, there are other things to be done...and doing a proper evaluation is going to take time and money and often I think the pressure is to use that time and money to do something new. And I think that's a kind of institutional problem really."

Table 4.2.2.: Factors promoting knowledge transfer in a central government

department

Factors promoting knowledge transfer	Description	Illustrative example	Number of sources
Culture of collaboration	Participants describe normative pressure, arising from shared values and assumptions, to consult widely when making risk-based decisions.	“There is expertise and you know if you don’t use it then it’s silly. And you are required to bring the experts on board. Even to the extent where you’re encouraged if someone else has done something very similar to you go and have a chat with them, see what problems arose.”	23
Risk registers and team communication	Risk registers facilitate greater within team communication on risk.	“I will discuss the risk register at every partnership board meeting, to make sure that things haven’t changed.”	22

Table 4.2.3.: Factors limiting knowledge transfer in a central government

department

Factors limiting knowledge transfer	Description	Illustrative example	Number of sources
Lack of knowledge retention	Knowledge is lost when employees change or leave roles.	“You lose staff and you lose understanding, especially local knowledge, local issues and local problems”	14
Lack of financial resources	Lack of financial resources limits the time and effort participants can commit to knowledge transfer.	“Where I might let ourselves down is consulting with hard to reach [stakeholder] groups. That might not necessarily be the department’s fault because they have lots of guidelines on how I communicate with different people but now I have a budget reduction and it is harder to do certain things”	14
Lack of time	Limited time reduces the knowledge transfer activities participants can engage in.	“[...] sometimes if you just had a bit more time you could plan around it better and really think through what it is I am doing.”	10
Lack of formal knowledge sharing	Paucity of formal mechanisms to transfer knowledge laterally between policy teams	“Even if you do capture it [experience], there’s no real mechanisms for sharing it across the department.”	4

4.5. Case study two results – dimension two: shared knowledge

The second emergent theme in case study two was how shared perceptions of risk management affected risk management pervasiveness. Here those results are detailed.

Tables 4.3.1-4.3.7. describe the qualitative codes identified in the data. Tables include the number of participants whose data contains each code and so indicate the extent to which each code is represented in the data.

4.5.1. Patterns of risk management practice

Analysis revealed considerable variety in risk management practice across the policy teams surveyed. Risk management practice observed fell into two categories, that which reflected the Department's formal rules and procedures regarding risk (code: 'formal risk management practice', Table 4.3.1.) and that which did not (code: 'informal risk management practice', Table 4.3.1.). Formal risk management practice was explicit, following a systematic methodology, such as risk registers and written risk assessments. Informal risk management practice was based on logic or process that was not made explicit, for example, individual intuition. Eleven participants thought that risk management practice, but particularly informal risk management practice, varied considerably between individuals and policy teams;

"[...] how that [informal risk management] manifests itself, does differ from work area to work area. I, for instance, have external stakeholders on most of our project boards but not every policy area in [the Department] will do things that way."

In particular, managing and communicating risk with stakeholders, and assessing risk were felt to be inconsistent across policy teams;

“I don’t think there’s guidance about that [risk communication with stakeholders], not that I’m aware of. And I think it has to be issue specific. I think it depends on your particular work area and your relationship with your stakeholders. So, well firstly I’m not aware of any sort of particular guidance on that. Secondly I think the rest of it is very variable, I guess the models depend entirely on who you’re dealing with and what your particular policy area’s like.”

“...there isn’t a clear externally defined way of measuring the importance of the risk, in terms of having a proper risk matrix; where you understand “This is what defines low, this is what defines medium,” or whatever else. Consequently you have a huge range in different assessments, and what different rag [red, amber, green] ratings actually mean, which is deeply unhelpful as a general rule.”

This trend was consistent throughout all the policy team members interviewed, overall each policy team describing a mixture of formal and informal risk management elements (Table 4.3.1.). It is important to note that informal and formal risk management was not delineated by policy teams, rather all teams displayed aspects of formal and informal risk management practice. For example, the formality of a policy team’s risk management practice may vary from one project to another;

“No I don’t [use a risk register] and maybe I should. I inherited this programme. [In previous projects] I was using risk registers and issue logs. But this programme was a large programme that was up and running but with no real resource input.”

Beyond the mixture of formal and informal risk management practice observed, a smaller number of respondents (n=5) described examples where policy development was not driven by risk, or where risk played a minor role (code: 'not driven by risk at all', Table 4.3.1.). Finally, some respondents (n=4) described examples where, although formal risk management processes were being carried out, engagement was superficial and the extent to which risk was actually informing policy was negligible (code: 'going through the motions', Table 4.3.1.).

Table 4.3.1.: Pervasiveness of risk behaviour within and across policy teams

This table illustrates the codes describing the pervasiveness of risk behaviour within and across policy teams. The results show that risk management is constituted of a mixture of formal and informal practices. Formal risk management is defined as with an explicit logic and evidence base, and following a repeatable method. Informal risk management is defined as with an intangible or otherwise invisible logic and evidence base, which is therefore un-auditable or repeatable. Furthermore a number of participants admitted that risk did not play a significant role in their work, or that their engagement in risk management was tokenistic. Participant’s perception of whether risk management was pervasive throughout the Department was roughly equally split between those who thought it was not pervasive and those who thought it was.

Code	Description	Example	Number of respondents (number of codes)
Formal risk management practice	<i>Risk management practice that follows codified protocol and is explicit.</i>	“I update it [risk register] on a monthly basis. And I have meetings every two weeks where I discuss our policy in each and every strand of our work and what’s coming, which basically is the main document that keeps us on track. And then that feeds into the wider project board document that goes out.”	18 (56)
Informal risk management practice	<i>Risk management practice that follows an implicit logic and method not obviously related to codified protocol</i>	“I think with the stuff I’ve been doing, you know the day to day business I’ve been doing for years and probably you don’t think that much in terms of formal risk management. Maybe you do it kind of instinctively.”	20 (79)
Not driven by risk at all	<i>The participant describes a situation where their behaviour is not driven by risk.</i>	“No [risk does not inform policy], because usually by the time our economists have calculated what the impact on small businesses will be it’s too late to change the policy. In my experience, you’re already so committed that actually what it [risk] does is inform the way you present the policy but it doesn’t change the policy.”	5 (11)
Going through the motions	<i>Actor does actions that are formally required, but this does not lead to increased risk awareness or more risk informed decisions.</i>	“I think in policy sometimes it just seems to be that I are filling in forms for the sake of filling in forms and I don’t know if I are really doing PPM properly there but that’s the way - sometimes an organization sets something in place and I do it because I have to do it.”	4 (5)

4.5.2. Affect of formal governance on risk management practices

Formal risk management practice predominantly took place within programmes or projects and managing delivery risk (Table 4.3.2.). These are areas which have more formal, hieratical governance (Tsai 2002) for risk, namely, standardized reporting of risk to programme boards and the use of PPM processes to manage policy delivery;

“If you have got quite a formal programme that’s being managed using PPM there’ll be a risk register somewhere.”

In contrast, informal risk management behaviour was largely found within on-going work and during policy formulation: both areas with less formal governance and process (Table 4.3.2.);

“I worked previously in a much more reactive environment XXX. It was much less programme and project managed. As a result I think risk was less systematically approached there.”

It should be noted that, although most did, some projects did not formally manage risk despite governance mechanisms requiring it (Table 4.3.2.);

“[...] on my projects when they were first set up, I put some risks together in the kind of project plan. The programme itself is risk managed, because the [XXX] Unit’s run as a programme with lots of projects, [so there is] a risk kind of tool that in theory’s there and I can put into but I just don’t particularly pay much attention to it.”

Investigation of the factors driving and shaping (Table 4.3.3.) risk management practice further supports the emerging trend. Formal risk management behaviour was largely driven by codified processes and leadership expectations (Table 4.3.4.). In contrast, informal risk management behaviour was shaped by experience, and internal consultation and collaboration (Table 4.3.4.). Five of the nine participants who explicitly stated that the risk management they were engaged in was not driven by codified processes were referring to informal risk management practices (Table 4.3.4.).

Table 4.3.2.: When and where risk management is pervasive

This table shows the overlap between codes. Each column and each row represent one qualitative code. The number in each column and row intersection indicated the number of data sources in which the codes overlap (the number in brackets is the total number of time the codes overlap within those data sources). This table illustrates the distribution of formal and informal risk management practices by stage in the Policy Cycle and type of governance. The results illustrated show that formal risk management tools are predominantly used to manage delivery risk. However, there is a greater tendency for delivery to be managed with minimal attention to risk (code 'not driven by risk at all'). Furthermore formal risk management tends to take place in the context of 'programmes or projects' rather than 'ongoing work'.

	Risk management pervasiveness codes:		
	not driven by risk at all <i>'Participant does risk management actions that are formally required, but without making risk informed decisions.'</i>	Formal risk management practice <i>'The participant describes a situation where risk management process is explicit and formalised.'</i>	Informal risk management practice <i>'The participant describes a situation where risk management process is implicit and ad hoc.'</i>
Delivery or pre-delivery risk:			
managing delivery risk <i>'Risks which threaten the implementation of a policy.'</i>	3 (34)	9 (51)	1 (10)
Pre-delivery risk (policy formulation) <i>'Risks identified during the development of a policy prior to its implementation.'</i>	1 (20)	0	11 (42)
Programme or project <i>'Work sits within a more formal governance structure with a programme or project board, clear objectives and deadlines.'</i>	1 (25)	15 (112)	4 (31)
On-going work (no project) <i>'Work is on-going with no clear end point in terms of objectives or time, governance often less formal.'</i>	0	0	7 (41)
Clear target <i>'Work has a clear and explicit objective.'</i>	0	4 (30)	0

Table 4.3.3.: Factors driving and shaping risk management practice

This table illustrates the codes describing the factors which drive and shape risk management practice. Driving risk management behaviour is defined as causing the participant to initiate or otherwise engage in risk management activities.

Code	Description	Example	Number of respondents (number of codes)
Informal consultation and collaboration	<i>Risk behaviour is shaped by informal consultation and collaboration between employees.</i>	“It gets discussed very thoroughly to the point where everybody throws in their bit and then they decide whether it's a definite threat or I could live with it.”	18 (86)
Leadership expectations	<i>Risk behaviour is influenced by direct line managers and team leaders (and the requirements and pressure they put on their subordinates as regards risk management).</i>	“If you are working for somebody who is very ambitious and wants to get ahead, the pressure on you to make sure everything is correct is going to be great.”	16 (37)
Codified processes	<i>Explicit, set in text, processes drive peoples risk behaviour and influence their risk based decisions</i>	“They do actually have to go through business cases and strategic... Outline strategic business cases, risk registers etc. So they're forced to go through some of this. Which the established areas don't have to do.”	16 (68)
Experience	<i>Professional experience shapes risk behaviour.</i>	“The longer you're in a Department, the more you realise, and you can work from experience, in terms of what does and doesn't work.”	13 (40)
Stakeholders	<i>The relative importance of a risk is influenced by external stakeholders and their perception of the risk.</i>	“And I've thought it isn't a potential risk but then I go and I have a meeting with another stakeholder and something similar might arise. And then it becomes an issue and it's sort of gathering that and then taking it and trying to appraise for that.”	12 (40)
Not formal guidance	<i>Risk behaviour is explicitly not informed by formal guidance.</i>	“In terms of risk in this job I haven't seen any sort of formal risk guidance that outlines how to assess risk and deal with risk.”	9 (17)
Training	<i>Past training received drives current risk behaviour.</i>	“It's risk training from the past, I've done a lot of good training stuff. So, there's online guidance on running programmes and projects, which, has the risk around – risk management is just, it's a basic part of how I manage projects within [the Department].”	7 (17)
Normative	<i>The shared perception that risk is something that is important and should be a part of policy development.</i>	“So you know everyone is very conscious of risk and yes you're aware that it's something you should do but also so is your boss and so on and so forth.”	7 (10)
Individual pragmatic legitimacy	<i>Risk management is seen as something that benefits policy development.</i>	“But also I think at the end of the day people realise it's [risk management] the sensible thing to do anyway really.”	6 (8)

Table 4.3.4.: Relationship between risk management drivers, shapers and risk management practices

This table shows the relationship between codes. Each column and each row represent one qualitative code. The number in each column and row intersection indicates the number of data sources in which the codes overlap (the number in brackets is the total number of times the codes overlap within those data sources). This table shows the following. Where formal processes drive risk management the use of more formal risk management tools is prevalent. Informal risk management is largely informed and shaped by experience, and internal consultation and collaboration. Where formal guidelines are explicitly not relied upon, risk management tends to be informal. Formal risk management is defined as with an explicit logic and evidence base, and following a repeatable method. Informal risk management is defined as with an intangible or otherwise invisible logic and evidence base, which is therefore un-auditable or repeatable

Codes describing: Factors driving and shaping risk management behaviour	Codes describing: Risk management behaviour			
	going through the motions <i>'Participant does risk management actions that are formally required, but without making risk informed decisions.'</i>	not driven by risk at all <i>'The participant describes a situation where their behaviour is not driven by risk.'</i>	formal risk management <i>'The participant describes a situation where risk management process is explicit and formalised.'</i>	informal risk management <i>'The participant describes a situation where risk management process is tacit and intangible.'</i>
codified process <i>'Explicit, codified processes drive peoples risk behaviour and influence their risk based decisions.'</i>	2 (32)	1 (21)	13 (123)*	1 (23)
experience <i>'Professional experience shapes risk behaviour.'</i>	0	0	2 (33)	6 (45)
internal consultation and collaboration <i>'Risk behaviour is shaped by consultation and collaboration between employees.'</i>	0	1 (13)	0	10 (69)
not codified guidelines <i>'Risk behaviour is explicitly not informed by formal guidance.'</i>	1 (24)	1 (24)		5 (58)

** Of those codified processes driving risk behaviour Project Management Processes (n=11) and Gateways (required processes to gain approval and funding for projects) (n=5) where the most significant.*

4.5.3. Institutional and cultural factors

The culture in the department had several other features which suggest it is inherently compatible with the diverse risk management practice observed. First, participants (n=14) perceived top-down control to be predominately outcome focussed;

“I’ve never been overly concerned with the process; it’s more the outcome, and I think you need that. I think that [the Department] acknowledges that everybody works differently, and that what works for somebody might not work for someone else.”

Secondly, participants (n=12) expressed a closely related assumption that risk management had to be flexible and devolved in order to accommodate the context specific aspects of risk;

“I don’t think there’s guidance about that [risk management], not that I’m aware of. And I think it has to be issue specific. I think it depends on your particular work area and your relationship with your stakeholders.”

4.5.4. Perception of risk and risk management

Investigation of the conceptualisation of risk management among interviewees revealed diverse perceptions, with no strong common understanding of the purpose of risk management, the main beneficiary of risk management and the effect of formal risk management (Tables 4.3.5. and 4.3.6.). For example, five participants described

risk management in risk averse terms, as a means to reduce risk and avoid mistakes in policy development (code: 'avoid mistakes', Table 4.3.5.);

"I would hope that as a result of taking a risk based approach, there is less of a tendency for the Department to make bad policy and policy which has to be reversed."

While other participants with a more risk seeking attitude (n=4) viewed risk management as a means to take more risk and push forward policy development (code: 'take on risks', Table 4.3.5.);

"Risk management allows you to actually make decisions and get on and do things instead of just, kind of, being paralysed by the fear of something going wrong."

There was also little common consensus on whom or what the main beneficiary of risk management was among participants (Table 4.3.5.). Participants were largely split by those who believed the end customers (main parties affected by policy) were the main participant (codes: 'direct stakeholder' and 'the public', Table 4.3.5.);

"I think the whole organisation benefits from it but, ultimately, one would hope that those people who are going to use, or be part of, the policy, those people who'll be subject to the policy. Whether that be somebody in local government or an individual or someone else, can feel that the policy itself has been properly thought through, and that where there may be risks to their particular interest, those risks have been taken into consideration."

And those who identified the Departments or Government's reputation as the main beneficiary (codes: 'Department's reputation' and 'Government's reputation', Table 5);

“In terms of the risk management, I suppose it benefits [the Department]'s reputation among other Departments because I seem to be, not being a maverick Department going ahead and doing things without consulting people.”

Participant's perception of the purpose of formal risk management was similarly varied (Table 4.3.6.), including a range of positive and negative perceptions. Positive perceptions of the effect of formal risk management included that it helped prioritises risks and risk mitigation (n=5); it focussed attention onto risk (n=5) and that it facilitated participatory risk management by making risks explicit and visual and thus, more accessible for a wider range of individuals to quickly engage with (n=5) (Table 4.3.6.);

“I find having a formal risk register has been very useful [...] it encourages everybody within the team, regardless of where you are to comment and to flag things which wouldn't happen otherwise.”

Negative perceptions of formal risk management were also present (Table 4.3.6.). For example, the perception of six participants that risk management was primarily a tool make their risk management activities visible to superiors and not a means to inform

their policy-making with risk; (code: ‘demonstrate risk management activity’, Table 4.3.6.);

“They’re [risk management processes] a useful way of demonstrating or communicating that you’re thinking about risk [...] but they don’t necessarily make you think about risks if that makes sense.”

At a more extreme level, five participants viewed formal risk management as meaningless bureaucracy (code: ‘unnecessary bureaucracy’, Table 4.3.6.) and therefore resisted engaging in those risk management practices;

“[...] there is still a lingering feel in the department, particularly amongst policy officials, that anything to do with PPM [project and program management] which would encompass things like risk registers is a meaningless burden. It’s just stupid processes that you have to go through but there’s no value to it. So that means people aren’t really going to be paying attention to it.”

The overall lack of consensus regarding risk was reflected in the variety of core risks driving policy development. The risks that were attributed particularly high importance (core risks) were identified by the relative emphasis placed on risks by participants (Table 4.3.7.). For example, if a participant emphasised one risk through quantity of iterations or choice of language it was coded as a ‘core risk’. Although risk of European Union (EU) infractions and negative stakeholder responses were the most common core risks, there was no core risk that was identified by all participants (Table 4.3.7.).

Table 4.3.5.: Conceptualisation of risk management ^c

This table describes how participants conceptualised what and who risk management was for. This reflects underlying assumptions about risk management’s role within the organization. The data shows an overall lack of consensus as to what and who risk management was for. The main perceived beneficiaries were the reputation of the Department and the end customer. Perceptions of the purpose of risk management were more diverse. Purposes described ranged from producing good policy, to benefitting the reputation of policy makers, to benefitting the individuals involved in developing policy.

Main code and sub-codes		Number of respondents (number of codes)
Main code	Sub-codes	
Beneficiary of risk management – <i>the participants’ perception of who or what the main beneficiary(ies) of risk management are.</i>	Direct stakeholders	9 (10)
	Department’s reputation	8 (9)
	Minister(s) responsible for policy	6 (6)
	Government’s reputation	4 (5)
	The public	4 (6)
	Project team	3 (3)
	Person formally responsible for risk	3 (3)
Main code	Sub-codes	
Purpose of risk management – <i>the participants’ perception of the purpose of risk management.</i>	Avoiding making mistakes	5 (6)
	Make decisions despite risks	4 (5)
	Incorporating and balancing stakeholder interests	3 (4)
	To produce better policy	3 (4)
	Meet bureaucratic demands	3 (3)
	Benefiting the Department’s reputation	2 (2)
	Benefiting Government’s reputation	2 (2)
	Covering your back	2 (4)
	Tool to push individual agenda	2 (2)
	Increasing risk awareness	2 (2)
	Facilitate proactive risk management	2 (2)
	Prioritising limited resources	1 (2)

^c *Examples of data behind codes within Table 4.3.5. can be found in appendix I.*

Table 4.3.6.: Perceived effect of formal risk management ^d

This table describes how participants perceived formal risk management. Perceptions are varied. Perceptions of the effect of formal risk management range from: improving risk management; to benefitting project management and an unnecessary bureaucratic burden. Of particular note is the perception that formal risk management is desirable as a way to make explicit and thus demonstrate risk management activity to superiors. This suggests some participants perceive that their superiors have a positive attitude towards risk management and expect to be gain personal benefit from being seen to manage risk.

Main code and sub-codes		Description	Number of respondents (codes)
Main code	Sub-codes		
Perceived effect of formal risk management <i>Formal risk management is defined as with an explicit logic and evidence based, and following a repeatable method.</i>	Demonstrate risk management activity	<i>Formal risk management allows individuals to make visible their risk management activities, particularly to superiors.</i>	6 (9)
	Help prioritise risks and work	<i>Formal risk management helps organise work by identifying goals, priorities and deadlines.</i>	5 (9)
	Facilitate participatory risk management	<i>Codifying risks and making them explicit allows a wider number of individuals to be aware of the risks and engage in risk based decision making.</i>	5 (9)
	Unnecessary bureaucracy	<i>Formal risk management activities do not benefit or change risk behaviour.</i>	5 (9)
	Prompt attention on risk and risk management	<i>Formal risk management reminds staff to be aware of risks and to engage in risk management activities.</i>	5 (8)
	Facilitate proactive risk management	<i>Formal risk management encourages forward looking risk management.</i>	4 (5)
	Help keep track of risks	<i>Formal risk management helps individuals keep aware and up-to-date with risk.</i>	3 (4)
	Keeping aware of project plan	<i>Formal risk management keeps individuals aware of project progress and thus identify upcoming tasks and priorities.</i>	2 (2)
	Formally assign risk owners	<i>Formal risk management identifies risk owners and thus assigns responsibility.</i>	1 (1)
	Helps identify risks	<i>Formal risk management increases the likelihood of identifying risks.</i>	1 (1)

^d Examples of data behind codes within Table 4.3.6. can be found in Appendix I.

Table 4.3.7.: Core risks driving risk management

This table shows the driver or risk that was the main factor influencing participants risk behaviour. The results indicate that overall the main factors were a desire to avoid EU infraction and to avoid a negative response from stakeholders.

Core driver or risk:	Example	Number of respondents (number of codes)
Avoiding EU infractions	“Risk is everywhere, and you've got to mitigate risk because I'd get infractions if I don't.”	7 (12)
Avoiding negative stakeholder response	“A lot of mine is around stakeholders so what stakeholders' views are likely, well and consumer views. So if I go down a certain path how a stakeholder's going to respond to it.”	5 (8)
Risk to the Department's reputation	“And against the reputational damage that it might do to the Department.”	4 (4)
Managing limited resources	“[...] more recently I suppose money and resources.”	3 (6)
Risk to UK Gov or minister reputation	“I guess I'd be more focused on the reputation risk to the Department.”	3 (3)
Balancing stakeholder interests	“I have to – I walk a tightrope between the obligations of the European directives and the desires of people who would like there to be less regulation.”	2 (2)

4.6. Summary of results.

Through describing the processes and actions of two organisations seeking to achieve pervasive risk management (Chapters 4.2., 4.4. and 4.5.), the case studies revealed some of the social processes (Burgess 2010) and cultural factors (Johnson 1992) involved. Social processes are defined as ways of thinking and interacting that establish patterns of behaviour within social groups (Burgess 2010). For example ‘imitation’ is a social process which transmits new ideas between groups and individuals and ‘subjugation’ is a social process which affects the distribution of power with groups (Burgess 2010). Cultural factors are defined as shared values and beliefs which affect group behaviour (Johnson 1992; Schein 2004).

The findings of case study one described how experiential knowledge was used and shared within the organisation. Case study one also revealed the relationship between sharing experiential knowledge, communication and coordination. Case study two described both the sources of information used to inform risk management and patterns of risk management practice across the policy teams interviewed. Case study two revealed the importance of informal, lateral communication to risk management; and the relationship between participants’ perceptions of risk management and their risk management practice. In the following chapter these findings will be analysed with reference to the relevant literature in order to identify common themes and develop an explanation for them.

5. Discussion

Introduction. Here the premise and context of this research, as set out in more detail in the introduction and literature review, are recapitulated. This research deals with how organisations can achieve pervasive risk management, defined as risk management that is coordinated and consistent. There is a growing body of literature, in the fields of risk management maturity (Strutt et al. 2006) and enterprise risk management (Kimbourgh and Componation 2009), that argues effective risk governance requires risk management practice that is coordinated and consistent across an organisation. Further, there is increasing demand put on organisational leadership to control risk management across the entirety of organisations to provide assurance to stakeholders (Arena et al. 2010). However, the proliferation of risks faced by organisations (Power 2004; Power et al. 2009) and necessary involvement of multiple individuals (Weick 2005) and stakeholders groups (Klinke & Renn 2012) makes achieving pervasive risk management challenging. This is particularly the case where risks are difficult to quantify and where the relevant expertise is distributed across an organisation, requiring the delegation of risk management responsibility (Fraser & Henry 2007).

The literature review (chapter 2) identified key questions on how organisations can achieve pervasive risk management. It revealed uncertainty on the role of informal aspects of organisational life, such as organisational culture, in achieving pervasive risk management. The research that followed subsequently focused on the social processes and cultural factors that affected how the case study organisations coordinated their risk management practices. In summary, this research shows that, in

the two organisations researched, to achieve pervasive risk management, aligned with corporate objectives and with employee ‘buy-in’, risk managers needed to ensure local expertise was valued, risk relevant knowledge was shared laterally and vertically across the organisation, and that a shared understanding of risk management’s purpose is established and maintained. The novelty of these findings is to identify and describe social processes through which risk culture can affect the pervasiveness of risk management. The implication for risk management is that pervasive risk management cannot always be achieved through formal processes alone. Further, by developing an explanation for how the social processes and cultural factors identified affect risk management practice, the findings provide guidance on how organisations might achieve pervasive risk management, particularly in complex and dynamic environments.

Discussion overview. In chapters 5.1, 5.2, and 5.3 the case studies are discussed separately. The case studies reveal three social processes that affected risk management pervasiveness: informal communication; deference to expertise and representation (Asch 1987) (Table 5.1.). Representation is defined as the cognitive process by which individuals predict the impact of their actions on the wider organisation or group they are a part of (Asch 1987). Further, three cultural factors necessary for those processes to produce coordinated risk management are identified from the case studies: respect for experience; a culture of collaboration and a shared strategic vision of risk management (Table 5.1.).

Table 5.1.: Summary of social process and cultural factors affecting risk management practice identified in the case studies.

Chapter	Context	Social process	Cultural factor (s)	Effect on risk management pervasiveness ^c
5.1.	Power Utility (Case study one)	Deference to expertise ^a	Shared experience; Respect for experience (a high value attributed to direct experience)	By promoting communication and utilisation of experiential knowledge ^b , shared experience and respect for experience facilitated coordination and understanding between operational and managerial employees.
5.2.	Government Department (Case study two – knowledge transfer)	Informal, lateral communication	Culture of collaboration	The informal communication driven by the cultural of collaboration facilitated the aggregation of knowledge and development of a common understanding on risk issues. However, without formal support informal communication was vulnerable to knowledge loss through staff turnover and resource pressures.
5.3.	Government Department (Case study two – shared knowledge)	Predicting the wider impact of individual risk management actions (representation ^d)	Common understanding of the purpose and function of risk management	Lack of a common understanding of the purpose and function of risk management lead to lack of individual engagement in risk management processes and uncoordinated risk management practice.

^a ‘Deference to expertise’ refers to the delegation of decision making rights to those perceived to have the highest relevant expertise rather any other criteria, such as seniority (K E Weick et al. 1999).

^b ‘Experiential knowledge’ refers to knowledge gained from first-hand experience of the phenomena to which the knowledge relates. It includes specific knowledge: knowledge that cannot be easily shared through a symbolic language or numbers, for example tacit knowledge.

^c ‘Pervasiveness’ refers to the extent to which risk management is embedded and coordinated across an organisation.

^d Representation refers to the process by which individuals imagine how their actions will affect their social group (Asch 1987).

In chapters 5.4 and 5.5 the common themes between the case studies are discussed. An important common theme that emerges between the case studies is ‘coordination through mutual adjustment’. Coordination through mutual adjustment is defined as reciprocal coordination between interdependent parties and is a particularly flexible and adaptive form of coordination (Thompson 1967; Mintzberg 1979). Chapters 5.4 and 5.5 discuss how the social processes identified in the case studies (Figure 5.1.) act to integrate risk relevant knowledge distributed across organisational members and stakeholders, allowing those actors to coordinate their risk management practice through mutual adjustment.

In chapter 5.6 the social processes identified in the case studies (Table 5.1.) and the explanation of their function (chapters 5.4. and 5.5.) are integrated to build an model describing how these social processes interact to affect risk management pervasiveness (Figure 5.2.). Finally, chapter 5.7 revisits the literature review (chapter 2) in light of the research findings and explores the role of the social processes identified (Table 5.1.) in achieving pervasive risk management in complex environments that require adaptive risk management.

5.1. Case study of a power utility company: respect for experience, shared experience and coordination.

The findings of this case study of a power utility company (chapter 4.2.) revealed how experience informed risk-based decisions in an organisational context and how that knowledge was utilised in a coordinated manner.

Although all knowledge is arguably derived from experience (Kolb 1984), experience in the context of expertise and naturalistic decisions, experience refers to knowledge gained from direct experience of the subject of that knowledge (Lipshitz et al. 2001; Hoffman 1996) or from practice that simulates experience of the subject (Ericsson & Charness 1994; Barnett & Koslowski 2002). For example, knowledge gained from playing chess would develop expertise, while the knowledge gained from reading about chess would not (Ericsson 2006). The critical difference being that direct experience of playing chess (or anything else) can result in a richer knowledge that includes tacit knowledge (tacit knowledge can only be gained through direct experience) (Polanyi 1966). Thus, for the purposes of case study one and this research, ‘experiential knowledge’ and ‘experience’ are defined as knowledge gained from direct experience of the subject of that knowledge. As such experiential knowledge may include specific knowledge (Jensen & Meckling 1995), such as tacit knowledge (Polanyi 1966). This is in contrast to ‘general knowledge’ (Jensen & Meckling 1995) that can be gained and communicated without the need for direct experience, for example by reading a book on the subject.

In case study one of a power utility interviewees described drawing on experience to inform risk-based decisions with specialised and context specific knowledge (chapter

4.2.1., Table 4.1.1.), particularly when faced with unpredictable and dynamic risks (chapter 4.2.2., Tables, 4.1.3. and 4.1.4., code: 'complex risk decision', and Table 4.1.5.). Interviewees reported that utilising experiential knowledge in risk-based decision making allowed their responses to risks to be more adaptive than could be achieved by codified rules and procedures alone (chapter 4.2.2. and Table 4.1.5.). This is consistent with what would be predicted by naturalistic decision making theory that ascribes the ability of experts to make sense of complex and unusual circumstance to their experience (Klein 2008; Lipshitz et al. 2001). The other context associated with use of experiential knowledge, time pressure (Tables 4.1.3. and 4.1.4., code 'high time pressure'), is also consistent with contexts in which intuitive expertise is typically used (Agor 1986).

However, the findings also illustrated that experiential knowledge did not act in isolation of other factors influencing risk-based decisions (Table 4.1.2.) and crucially, interacted with codified processes and rules (chapter 4.2.3.). This occurred through two main mechanisms: first, using experience to assess whether the response specified by a codified rule seemed appropriate; and second, using experience of a specific context to adapt the codified, generic response to a risk (chapter 4.2.3.). A key finding of case study one was that a widespread 'respect for experience' (Table 4.1.6., code: 'respect for experience') encouraged and legitimised this use of experiential knowledge, particularly in relation to formal rules (chapter 4.2.3.). Respect for experience is defined as 'recognising that the experience of others may be of use to the individual, actively seeking it and learning from it' (chapter 4.2.3. and Table 4.1.6.). The effect of respect for experience was that interviewees often supplemented their own experience with that of others (chapter 4.2.1. and table 4.1.2., code:

‘colleague’s experience’) and felt able to openly use that experience in their risk-based decisions (chapter 4.2.3. and Table 4.1.6.). By legitimising the explicit use of experience to inform risk management practice (chapter 4.2.3. and Table 4.1.6.) respect for experience contributed to the situation observed in the power utility where experiential knowledge was regularly used to create and adapt rules (chapter 4.2.3.). For example, the respect for the experience of a low ranking member of staff repairing cables led to that individual’s experiential knowledge being widely consulted, learned from and integrated into operational guidelines (chapter 4.2.1. pp. 69). Such delegation of decision rights on the basis of expertise and regardless of seniority is referred to as ‘deference to expertise’ (Weick et al. 1999). The effect of deference to expertise, driven by respect for experience, was that risk management rules and procedures were adapted to operational realities (chapter 4.2.3.). However, in contrast, where participants felt that their expertise was not valued or reflected in rules and procedures this sometimes lead to a lack of engagement and ‘buy-in’ to those rules or procedures (chapter 4.2.3.). For example, the requirement to complete a new risk assessment on everyday of a project even if the situation had not changed, rather than modify a single risk assessment as needed, was resented by some employees who treated it as an unnecessary process (chapter 4.2.3. pp. 79). Therefore, these results indicate that by encouraging experiential knowledge to be shared and used, respect for experience facilitated coordination between operational and managerial staff by helping to avoid rules being developed that did not reflect practical operational realities. This finding is consistent with those of Antonsen (2009) and Knudsen (2009) who found that the inability of operational staff and their managers to communicate effectively and establish a common understanding of safety issues led to administrative processes that did not reflect operational realities and rule breaking as a

means to compensate for those inadequate processes. However, the findings of this case study are distinct in A) providing a positive example of coordination being successfully achieved through deference to expertise and B) identifying an underlying cultural factor 'respect for experience' driving that process. A limitation of these findings is that interviewees may have been reluctant to report more extreme lack of compliance such as rule breaking.

Another factor affecting communication and coordination between operational and managerial staff in the power utility was shared experience (chapter 4.2.4. and Table 4.1.6., code: 'importance of sharing experience for communication'). Overlapping experience between individuals spanning hierarchal groups (such as between operational staff and line managers) facilitated communication of experiential knowledge (Table 4.1.6.) and coordination (Table 4.1.7) between those groups. Where operational and managerial staff shared relevant common experience they were able to communicate more effectively and had more trust in each other's judgement (Table 4.1.6.). However, where relevant common experience was lacking, communication and trust were reduced (Table 4.1.6.), which in turn negatively impacted the coordination (Table 4.1.7). For example, a failure to communicate the value of strategic asset risk assessment to business units lead to reluctance on the part of those business units to adapt their behaviour (increase reporting of local asset condition) to meet the needs of those carrying out strategic asset risk management (chapter 4.2.4. and Table 4.1.7.). These findings are consistent with research into coordination which finds that shared experience provides the common knowledge allowing individuals to share and understand experiential knowledge which is otherwise difficult to transfer (Carlile 2004) and conversely, lack of shared experience between organisational

subgroups limits knowledge sharing between those groups (Brown & Duguid 2001). However, the findings of this case study go further, identifying and describing the role of shared experience in coordinating risk management practice between individuals in operational and managerial roles. This is highly relevant to achieving pervasive risk management as many organisations find coordinating strategic and operational risk management particularly challenging (Economist Intelligence Unit 2009; AON 2007). Therefore, it is also significant that there was some indication that shared experience and experience in general were declining in the power utility due to a reduction in opportunities, such as apprenticeships or supervisory roles, for experienced staff to pass on experience (chapter 4.2.5.). Therefore, investigating the effect of different methods to actively manage experience and facilitate sharing experiential knowledge on achieving pervasive risk management would make an interesting topic for further research.

Summary. Case study one of a power utility identified ‘respect for experience’ as a key cultural factor that encouraged experiential knowledge to be widely shared and used in risk-based decision making in that organisation. In particular, respect for experience encouraged and legitimated the delegation of risk-based decisions to junior but experienced employees, a process referred to as ‘deference to expertise’ (Weick et al. 1999). This benefited risk-based decisions through a more accessible and richer body of expertise, and facilitated mutual coordination (Mintzberg 1979) between employees across hierarchical levels. The case study also reiterated the importance of shared experience to communication and coordination between organisation subgroups. These findings on respect for experience and shared experience are important because effective and timely sharing of knowledge is viewed as critical to

organisational ability to respond to risks in a proactive and adaptive manner (Grabowski & Roberts 1996; Bierly 1995). In particular experiential knowledge (expertise) can be critical to organisational ability to respond effectively to dynamic and novel risks (Weick et al. 1999; Weick 2010).

5.2. Case study two of a government department: lateral communication.

Case study two of a central government department (chapter 4.4.) revealed the importance of lateral knowledge transfer between policy teams, colleagues and stakeholders to the organisation's ability to coordinate the actions of the diverse and numerous actors involved in complex environmental risks.

Lateral knowledge transfer, defined as transfer of knowledge horizontally across hierarchal or functional divisions within organisations (Walczak 2005), was the most common source of knowledge used to manage risk reported by the policy teams interviewed (Table 4.2.1., codes: 'external stakeholders; informal communication between policy teams; specialist advisors'). For example, through communication with civil society groups and regulated industries, policy teams gained knowledge of how stakeholders perceived risks and how they might respond to policy options. Thus, informal communication was critical to the policy teams' ability to gain the specific (Jensen & Meckling 1995), contextual knowledge required to effectively manage risk (chapter 4.4.2). The importance of communication with stakeholders revealed in this case study is illustrated by one policy, developed by the case study department, which arguably failed due to insufficient communication with key stakeholders during the policy's development. The policy was not sufficiently informed by consultation with stakeholders, with the result that when it was publicised it was a surprise for key stakeholders and the public. The consultation and impact assessment were published four months after the policy was announced. Subsequent protest from non-governmental organisations, religious leaders and newly founded single issue groups made effective use of social media to mobilise widespread condemnation of the

policy. Indicative of the lack of communication between those developing the policy and stakeholders, government advisors reported being shocked at stakeholders' negative response. One senior Government advisor was quoted by national media sources as saying:

"I were so enamoured of this idea across the board. I love that kind of thinking ... it blinded us to the political implications."

Following the negative stakeholder reaction, support for the policy, which had previously been high among senior officials, dwindled and the policy was abandoned. The highly public nature of the failed policy caused reputational damage to the department and those involved. In the following sub-chapter (5.2.1.) the organisational and cultural factors that affected the lateral communication observed are discussed.

5.2.1 Factors affecting lateral communication

The department's culture of collaboration (Table 4.2.2., code: 'culture of collaboration') was a key driver behind the extensive informal communication observed. This culture of collaboration was described by participants (n=23) as a shared assumption that good policy making required consultation with others who had relevant knowledge or had an interest in the policy in question (chapter 4.4.3.). For example, policy makers felt an expectation to speak to colleagues who had worked in similar policy areas or consult external experts in the policy area. However, the findings also revealed two weaknesses associated with the informal communication

driven by this culture of collaboration: vulnerability to loss of knowledge through staff turnover (Table 4.2.3., code: 'lack of knowledge retention') and vulnerability to time and resource pressures (chapter 4.4.3.). Further, reliance on informal processes to inform risk management is neither systematic nor controlled (MacGillivray et al. 2007). Therefore, the results suggest that in order to further develop the risk maturity of this department and others like it, explicit communication that supports (not replaces) informal, lateral communication are necessary, for example: extended handover times, mentoring, corporate 'yellow pages' and greater use of cross functional project teams (Bollinger & Smith 2001).

A key contribution of this case study is to offer insight into how lateral communication might be supported more generally. The use of risk registers increased knowledge transfer within policy teams (Table 4.2.2., code: 'risk registers and team communication'). By requiring team members to make risk management knowledge explicit as numbers or text, risk registers facilitated knowledge transfer by creating a common language for risk knowledge (Grant 1996) and a forum where knowledge could be aggregated and shared (Moynihan & Landuyt 2009). Not all the policy teams sampled (seven out of twelve) used risk registers, therefore a first step towards enriching communication in the department would be to increase use of risk registers. However, the greater challenge is to develop mechanisms that achieve the same affect between policy teams and the wide range of experts and stakeholders they interact with. Such a mechanism must capture key risk relevant knowledge and make it widely accessible, both in the language used to represent the knowledge and the location where the knowledge is stored. Innovative research in this area, for example development of interactive models and 'games', will be critical to building the risk

management capability of the public sector by increasing the range of knowledge that can be effectively used to develop risk management interventions, increasing the quality and legitimacy of risk-based decisions therein.

Summary. The case study of the central government department (chapter 4.4.) identified some aspects of how knowledge informs environmental policy-making. An extensive network of informal, lateral communication was important to the department's ability to manage complex, environmental risks (Table 4.2.1). This network of communication allowed risk managers to gain and integrate knowledge on the perspectives of all the stakeholders involved, and provide stakeholders with information (chapter 4.4.2.). This reciprocal communication allowed risks to be managed in a way that all stakeholders could positively engage in, resulting in coordinated behaviour (chapter 4.4.2.). However, as described in this chapter, where communication was insufficient stakeholders may deliberately resist a policy rather than coordinate their actions to it. A significant factor driving the lateral communication observed was a culture of collaboration that effected normative pressure on policy makers to communicate with individuals and groups who had relevant knowledge or interest in the risks involved (Table 4.2.2.). The research also identified two weaknesses of the informal communication observed: vulnerability to losing knowledge through staff turnover and vulnerability to time and resource pressure (Table 4.2.3.).

5.3. Case study two of a government department: shared understanding.

The case study of a central government department (chapter 4.5.) described the variation in risk management practice across the policy teams sampled and identified possible explanatory factors.

The overall picture of risk management practice in the department was a mixture of formal risk management practice driven by top-down factors (codified rules and leadership expectations) and informal risk management practice, influenced by bottom-up factors, peers and individual experience (Table 4.3.4.). Engagement with risk management processes and coordination of risk management activity varied between risk management teams: high in some and low in others (chapter 4.5.1. and Table 4.3.1.). The findings illustrate where risk management practice was coordinated (well defined project and programmes) and where it was uncoordinated or absent (policy formulation and ongoing work) (Table 4.3.2.). These findings compliment descriptions of diversity in institutional risk management practice (Arena et al. 2010; Mikes 2009; Power 2008) with an account of variations in the risk management practice of individuals and teams. In particular, this case study provides a description of the dissociation between the formal descriptions of risk management and actual risk management practice predicted by Arena et al. (2010) and Power (2008).

The findings identify the extent to which the department's formal risk governance processes were effective in embedding risk management in policy development. For example, in high profile policy areas formal risk governance did predominantly shape the risk management practices of policy teams: evident in the association between the

presence of risk governance elements (codified processes and project management structures) and formal risk management practice (Tables 4.3.2., 4.3.4.). However, risk management was largely informal or absent outside of formal programmes and projects (Table 4.3.2.). Resistance to engaging positively with risk management processes was also observed, for example where risk management practices were either ignored or only superficially complied with (Table 4.3.1., codes: ‘not driven by risk at all; going through the motions’). Further, some risk management practice was varied and uncoordinated across the policy teams sampled, particularly the assessment of risk and participation of stakeholders in risk management (chapters 4.5.1. and 4.5.2.). Risk management practice also varied within policy teams, for example one policy team leader interviewed who had previously used formal risk registers reverted back to informal risk management when moving to a new policy area (chapter 4.5.1.). This suggests that, despite widespread awareness of risk management, governance structures and processes in place, risk management was not consistently or deeply embedded in policy-making practice and culture of the department. This finding is further supported by the relative lack of norms and pragmatic legitimacy supporting risk management (Table 4.3.3., codes: ‘normative; individual pragmatic legitimacy’).

Overall, the department’s culture displayed characteristics of an organic corporate culture (Deshpande et al. 1993); namely, a focus on results over process and the assumption that flexibility and devolved decision making were necessary (chapter 4.5.3.). While this cultural context is conducive to the variability in risk management practice observed, it does not explain why some policy teams engaged positively with formal processes while others did not. Nor, for example, does it explain why some policy teams were more, or less, risk-seeking than others.

However, the lack of engagement with risk management observed (Table 4.3.1., codes: ‘not driven by risk at all; going through the motions’) can be explained by the lack of consensus on risk management’s purpose and function between the individuals interviewed (Tables 4.3.5. and 4.3.6.). ‘Purpose’ refers to an understanding of what risk management is for and who benefits from it. For example, does risk management primarily benefit the Department or stakeholders? ‘Function’ refers to understanding of how risk management achieves its purpose. For example, does risk management function by minimising mistakes, or allowing policy teams to take on more risk and therefore, opportunities? Drawing on the coordination theory concept of ‘representation’ which proposes that the ability of an individual to coordinate her actions with a wider group is partially dependant on her ability to imagine how her actions will affect that group (Asch 1987), the observed lack of a shared understanding of purpose and function of risk management (Tables 4.3.5. and 4.3.6.) is a plausible driver of uncoordinated risk management practice observed (Table 4.3.1.). For example, understanding the purpose of risk management to be ‘protecting the Department’s reputation’ (Table 4.3.5., code: ‘department’s reputation’) may result in risk management activities which differ from those driven by an understanding that the purpose of risk management is to ‘create value for stakeholders’ (Table 4.3.5., code: ‘direct stakeholders’). The findings also suggest that the varied perceptions of risk management affected coordination through formal processes and governance mechanisms: participants who resisted engagement with risk management processes (Table 4.3.1., codes: ‘not driven by risk at all; going through the motions’) also described the function of risk management as ‘a means to avoid blame’ (Table 4.3.5., code: ‘covering your back’) or as ‘unnecessary

bureaucracy' (Table 4.3.6., code: 'unnecessary bureaucracy' and Table 4.3.5., code: ; 'meet bureaucratic demands').

These findings build on research into high reliability organisations (La Porte 1981) which found that they achieved coordinated yet flexible practice through shared norms (Faraj & Xiao 2006), objectives (Bigley & Roberts 2001) and 'sensitivity to operations' (Weick et al. 1999). Sensitivity to operations describes the common ability of actors in high reliability organisations to maintain a real-time understanding of how their actions interrelate with the wider organisation's actions and processes (Weick & Roberts 1993; Weick et al. 1999). This shared understanding of the wider system allows the coordinating parties to predict how their actions will affect the group and adjust them accordingly (Asch 1987; Weick & Roberts 1993). Further, the work of Howard-Grenville (2005) on organisational routines, is consistent with variability in risk management practice observed and the absence of bottom up buy-in to risk management (Table 4.3.3.), because this made it more likely for risk management processes to be co-opted for individual agendas that may or may not align with the department's risk management objectives. However, the results of this case study extend the prior art by identifying the importance of shared understanding of the *function* of risk management to coordination (in addition to shared objectives and awareness of wider system functioning). Further, this case study adds to previous research describing the effect of shared understanding at an organisational or team-based level (for example, Weick et al. 1999; Faraj and Xiao 2006) with a description of how a shared understanding, or lack of, affected individual risk management practice. Finally, a key contribution of these findings is the observation that a shared understanding of risk management's purpose and function not only affected

coordination through informal means but also coordination through rules and procedures. The implication of this finding for risk managers is that even where rigid coordination through standardisation is sought (Mintzberg 1979), a level of shared understanding on risk management's overall purpose and function is still required. However, the author acknowledges that making the purpose of risk management explicit is problematic. The espoused rationale for risk management practice may differ from actual rationales and unconscious heuristics or beliefs driving behaviour. Further, it is questionable if it is feasible or desirable that all persons hold a single understanding as to the purpose and function of risk management given the contextual nature of risk management. However, from a governance perspective it still may be important to establish an explicit and codified statement on the purpose and function of risk management that reflects the ambition of the organisations leadership and acts as a focus of discussion. As such, it will will act as a reference point for risk communication and action (Carlile 2004; Taylor and Van Every 2002), facilitating the coordination of risk management. It will also define the tool and metrics required to operationalize a truly enterprise-wide risk management system (Arena 2009).

Summary. The lack of a common understanding of the purpose and function of risk management observed in this case study (Tables 4.3.5, 4.3.6.) is likely to have contributed to the lack of consistency and coordination in risk management practice observed (Table 4.3.1.). Thus, the findings of this case study suggest that a common understanding of the purpose and function of risk management is essential to achieve risk management that is consistent and coordinated across the whole organisation, at least in the organisation researched. Finally, a key finding in this case study is that efficacy for both formal and informal coordination mechanisms were affected by the

extent to which employees had a common understanding on the purpose and function of risk management (Table 4.3.6.). The implications for those aiming to achieve pervasive risk management are: first, that individual ability to coordinate their risk management actions with those of the wider group is partly dependant having a shared strategic understanding (of the purpose and function of risk management); and second, formal governance mechanisms alone are therefore insufficient.

5.4. Cross case analysis: The role of dialogue in coordination

In both organisations studied, dialogue between colleagues, stakeholders and across the chain of command emerged as an important mechanism of knowledge transfer and coordination. Dialogue refers to forms of communication that allow the parties involved to understand each other's perspective (Shotter 1993; Pearce & Littlejohn 1997). For example, come to understand the values, assumptions and experiences that underpin the perspective of others, even if they do not agree with that perspective (Gadamer 1993). The three core processes of dialogue are suspending belief (Stewart et al. 2005), empathy (Rogers 1980) and establishing a shared way of speaking (Gadamer 1993).

Dialogue describes the communication observed in both studies that played an important role in shaping risk management practice (chapters 4.2.1., 4.2.3., and 4.5.2., Tables 4.1.2., 4.2.1. and 4.3.3.). The term dialogue reflects the nature of the communication observed, which involved transferring knowledge and creating shared meaning between individuals who sometimes had quite different perceptions and experiences of risk. The importance of dialogue to this thesis is the reciprocal transfer of knowledge it facilitated and resulting mutual coordination of risk management practice between individuals (Chapters 4.1 and 5.1) and between the organisations and their stakeholders (Chapters 4.2.3. and 5.2.). Dialogue achieved this by allowing the coordinating parties to take into account the knowledge of other involved parties when managing risks. In case study one of a power utility, vertical transfer of the specific knowledge of operational staff (for example, conditions of local electrical substations) to those responsible for creating and enforcing rules and procedures (for

example, determining optimal inspection regimes for all substations) allowed those parties to coordinate their behaviour in complex environments where standardized procedures were not always appropriate (chapters 4.2.2., 4.2.3. and Table 4.1.3., 4.1.7.). In case study two of a central government department, horizontal knowledge transfer between peers and stakeholders played an important role in creating mutual understanding between risk managers and stakeholders (chapter 4.4.2., 5.2. and Table 4.2.1.). For example, by engaging in dialogue with regulators, scientific experts and the regulated industries, risk managers were able to develop a mutually acceptable definition and assessment of a risk (chapter 4.4.2. pp.90). Conversely, there were examples of uncoordinated behaviour due to lack of dialogue in both case studies. For example, in the power utility inadequate communication between line managers and operational staff lead to a lack of engagement by operational staff that reduced the efficacy of strategic risk management (chapters 4.2.3., 4.2.4. and Table 4.1.7.). In the government department, failure to engage stakeholders in dialogue contributed to those stakeholders rejecting a policy, resulting in the policy being abandoned with associated reputational damage (chapter 5.2. pp.111). Dialogue was most prominent when risks where complex (dynamic and unpredictable) (Tables 4.1.3., 4.1.4.) and when formal rules where minimal or judged inadequate (chapter 4.2.2., Tables 4.1.4., 4.3.4., chapter 4.5.2. and Table 4.3.2.). Thus, the coordination observed, and the role of dialogue therein, is consistent with ‘coordination through mutual adjustment’ (Mintzberg 1979), which is typically achieved through reciprocal communication and associated with coordinating behaviour in the most complex and uncertainty environments (Carlile 2004). This is significant given the prior emphasis on coordination through standardization in the risk governance literature (chapter 2.3, pp. 35).

A key finding is that the use of dialogue to inform risk management observed in the case studies was not limited to situations where rules were absent or minimal. This is important because it indicates that informal coordination mechanisms, such as dialogue, do not act in isolation from formal coordination mechanisms, such as through rules of codified processes. In the power utility dialogue also informed decisions when rules were present. This also predominantly occurred where risks were complex and unpredictable (chapters 4.2.2. and Tables 4.1.4, 4.1.5.). In these situations dialogue was a means by which local experience supplemented established rules and guidelines to inform risk-based decisions (chapter 4.2.3.). For example, line managers relied on the specific knowledge (Jensen & Meckling 1995) of operators to identify when standard operating procedures might not be the safest way to execute a task and then, working with their line manager, determine how best to proceed (*i.e.* whether to follow, reject or adapt the formal procedures) (chapter 4.2.3.). Participants in case study one widely viewed the integration of experiential knowledge into risk-based decisions through dialogue as necessary because codified rules alone could not produce behaviour that was sufficiently adaptive to effectively manage complex risks (chapter 4.2.2. and Table 4.1.5.). For example, standard designs for electrical networks were not always sufficient given unusual geography or unusual combinations of old and new technology (Tables 4.1.1., 4.1.5.). Such interaction between operational staff, managerial staff, rules and experience reflects the classical definition of coordination through mutual adjustment: an adaptive, communication intensive method of coordination used when more inflexible methods of coordination, such as coordination through standardization, are inadequate (Mintzberg 1979). Further, in case study one it was observed that the efficacy of dialogue (as a means to

shared knowledge and establish a common understanding) was partially dependant on the communicating parties having sufficient shared experience (chapters 4.2.4. and Table 4.1.6., code ‘importance of shared experience for communication’). This was true from the perspective of both managers and managed. Managers were more confident in their ability to judge the competence of those they managed when they shared some experience (Table 4.1.6.) and those managed felt between able to communicate with their line manager when he or she had relevant experience (Table 4.1.6.)

In case study two of a central government department, risk management was more informal, often occurring with minimal prescriptive rules (chapter 4.5.1. and Table 4.3.1., code: ‘informal risk management practice’) and the relationship between rules and specific knowledge was less apparent. However, the findings here did also reveal an association between dialogue and specific knowledge: interviewees associated lack of ability to engage peers in dialogue (because they had left the role or organisation) with loss of context specific knowledge relevant to risk management (chapter 4.4.3.). For example, rapid rotation of staff between different policy areas was associated by some participants with an inability to gain to pass on specific knowledge (chapter 4.4.3. and Table 4.2.3., code ‘lack of knowledge retention’). Thus, in both organisations studied, dialogue is associated with the integration of specific knowledge into risk-based decisions which in turn facilitated coordination of risk management practices between colleagues and with stakeholders. Thus, the novel contribution of these findings is to describe how informal dialogue interacts with formal rules and processes to shape risk management practice that is coordinated, yet also flexible enough to adapt to a dynamic and varied environment.

Core finding. Dialogue contributed to coordinating risk management through mutual adjustment by facilitating the integration of knowledge distributed across employees and stakeholders in both the organisations researched (Figure 5.1.). In particular dialogue allowed front line employees and line managers to coordinate their behaviour by integrating specific knowledge (Jensen & Meckling 1995) with the general knowledge encoded in rules and procedures (Figure 5.1.). Further, the transfer of specific knowledge, such as tacit knowledge gained through direct experience, was dependant on a degree of shared knowledge between the communicating parties.

5.5. Cross case analysis: Non-dialogue based coordination

5.5.1. Deference to expertise

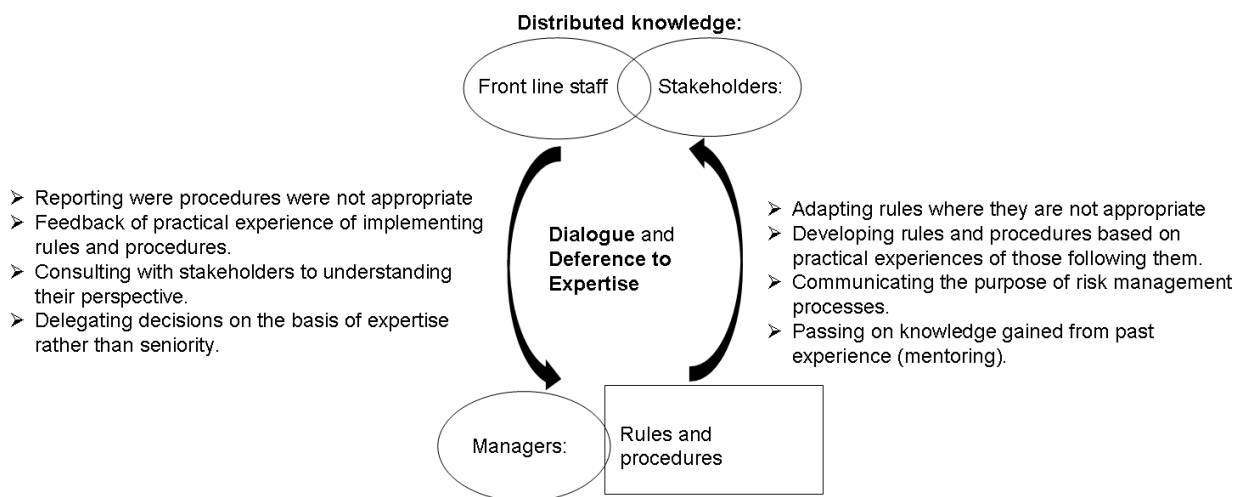
Dialogue was not the only process of coordination observed in the case studies. In both organisations integration of distributed knowledge to inform and coordinate risk management was also observed through a process called ‘deference to expertise’, which is the delegation of decisions to those with the greatest (relevant) expertise regardless of hierarchy or any other factor (Weick et al. 1999). Deference to expertise was most evident in the case study of a power utility (case study one) where it was driven by a widely shared ‘respect for experience’ that encouraged the communication of experiential knowledge and its explicit use in risk-based decisions (chapters 4.2.3., 5.1.2. and Table 4.1.6.). Respect for experience is defined as a high value attributed to concrete, experiential knowledge and those who held it. For example, respect for experience encouraged the delegation of the decision on how to repair a damaged cable to a junior but more experienced employee rather than the more senior project manager (chapter 4.2.1., pp. 64). Thus, rather than transfer experiential knowledge to the decision maker through dialogue (chapter 5.4.), the relevant knowledge was integrated into risk management decisions by delegating the decision to the experienced party. In the case study of the central government department (case study two), deference to expertise and respect for experience were less apparent. However, a respect for experience was implicit in the rationale behind the department’s outcome focused culture (chapter 4.5.3.), which gave considerable discretion on how to manage risks to policy teams. The rationale for the outcome focused culture given by participants (n=12) was that because risk management had to be flexible in order to

accommodate the specifics details of risks it had to be largely delegated to policy teams, who would be most familiar with those specifics (chapter 4.5.3.). The implication being that operational decisions on how to manage risks were being delegated to policy teams on the basis they had the most relevant expertise. The significance of this finding is that it expands the role of deference to expertise from a means of decision allocation (Weick et al. 1999) to include facilitation of coordination of risk management practice.

Here an explanation for the relationship between deference to expertise and coordination through mutual adjustment observed in case studies one and two is offered. One way to coordinate action without the need to share knowledge is to use standardised rules (Grant 1996; Mintzberg 1979). However, as case study one indicated rules and procedures are sometimes insufficient in unusual or novel circumstance (chapters 4.2.2. and Table 4.1.5.). In these situations the adaptability of coordination through mutual adjustment is required (Mintzberg 1979). This can be achieved through transferring knowledge, for example through dialogue (chapter 5.5.). However, transferring knowledge can be difficult and time consuming, especially with regards specific knowledge (Grant 1996; Brown & Duguid 2001). To avoid the costs associated with knowledge transfer, decisions can instead be delegated to individuals with the relevant knowledge (Jensen & Meckling 1995) as was observed in case study one and to a lesser extent in case study two (chapters 4.2.3., 4.5.3. and Table 4.1.6.). Thus, deference to expertise offers an alternative means (to dialogue) to integrate specific knowledge into risk-based decisions and thus coordinate risk management practice between those who had relevant specific knowledge and those who did not.

Core finding. In both organisations researched, deference to expertise, driven by a respect for experience, integrated specific knowledge into risk-based decisions (Figure 5.1.). This contributed to the coordination (through mutual adjustment) of risk management practice, particularly between those who had local, tacit knowledge on risks and those who did not.

Figure 5.1.: Summary of the role of ‘dialogue’ and ‘deference to expertise’ in achieving pervasive risk management observed in case studies of a Power Utility and a Central Government Department. *The transfer of risk-relevant knowledge (represented by the arrows) achieved through dialogue and deference to expertise allowed risk-based decision makers to draw on the knowledge distributed across multiple individuals and stakeholders, as well as formal rules and procedures. This allowed decisions makers to adapt actions to account for colleagues, stakeholders and rules, resulting in adaptive and coordinated behaviour. Effective dialogue and deference to expertise depended on a shared respect for experience and sufficient shared knowledge.*



5.5.2. Shared strategic understanding

In case study two of a central government department it was also observed that lack of a common understanding of the purpose and function of risk management undermined the coordination of risk management (chapters 4.3., 5.3.). The relevance to coordination is that shared knowledge, such as a common understanding of risk management's purpose, forms the basis of shared mental models which can play an important role in coordination through mutual adjustment. Shared mental models are used by groups to achieve coordination through mutual adjustment without the need for rules or intensive communication (Mathieu et al. 2000; Cannon-Bowers et al. 1993). Mental models are structured bodies of knowledge that allow individuals to describe, explain and predict events in their environment by recognising relationships between objects in that environment and constructing expectations on the likely result of those objects interacting (Rouse & Morris 1986). When group members share elements of their mental models they can predict the actions and resource requirements, including information requirements, of their fellow group members and how their own actions may influence the wider group (Mathieu et al. 2000) without the need to follow predefined procedures or for constant communication (Stout et al. 1999). This cognitive process of predicting the impact of ones actions on the wider group is called 'representing' (Asch 1987). Actors can then coordinate their behaviour based on their representation of how their actions will affect the wider group (Asch 1987). Thus, when communication is limited *and* task uncertainty precludes coordination through rules or standardised processes (Mintzberg 1979), coordination (through mutual adjustment) can be achieved through shared mental models.

The findings of case study two (chapters 4.5, 5.3.) described what would be expected when a shared mental model is absent. The lack of common understanding of the purpose and function of risk management (chapter 4.5.4. and Table 4.3.5.) corresponded to the uncoordinated risk management practice and lack of engagement with risk management processes observed (chapter 4.5.1. and Table 4.3.1.). Thus, the findings indicate that in the absence of a strong central message on risk management's purpose and how it achieved that purpose, a variety of interpretations existed that resulted in the diverse and sometimes uncoordinated risk management practice observed (chapter 5.3). For example, perceptions of risk management's purpose ranged from the outward looking, 'to benefit stakeholders' to the introspective, 'to benefit the organisation's reputation'. While perceptions of how risk management functioned ranged from: 'reducing the number of policy mistakes made'; to 'allowing decision to be taken despite risks', and even that 'risk management was an unnecessary bureaucracy' (chapter 4.5.4. and Table 4.3.5.). It is important to note that this shared understanding (or lack of) is a broad strategic understanding of the purpose and function of risk management. This corresponds with research into coordination in high reliability organisations where adaptive coordination is partly achieved through shared objectives (Bigley & Roberts 2001). However, these findings also identify the importance of a shared understanding of the function of risk management in addition to its purpose. The implication of this is that those wishing to achieve pervasive risk management must not only communicate the objectives of risk management but also how risk management will achieve those goals.

A key insight from case study two regards the interaction between shared mental models (or lack of) and formal risk governance mechanisms (rules and procedures). It

was observed that diverse perspectives of the purpose and function of risk management also had an affect of the perception and implementation of formal risk management processes (chapter 4.5.4. and Table 4.3.6.). Some interviewees had positive perceptions of formal risk management processes, for example that it helped focuses attention of risk, and positively engaged with those processes. For example, five participants used a risk register to facilitate communication and knowledge sharing within their teams (chapter 4.5.4. and Table 4.3.6.). In contrast, five participants viewed formal risk management processes as an unnecessary bureaucracy, resulting in the reduction of formal risk management processes to ‘box-ticking’ exercises which did not significantly inform risk-based decisions making in their teams (chapter 4.5.4. and Table 4.3.6.).

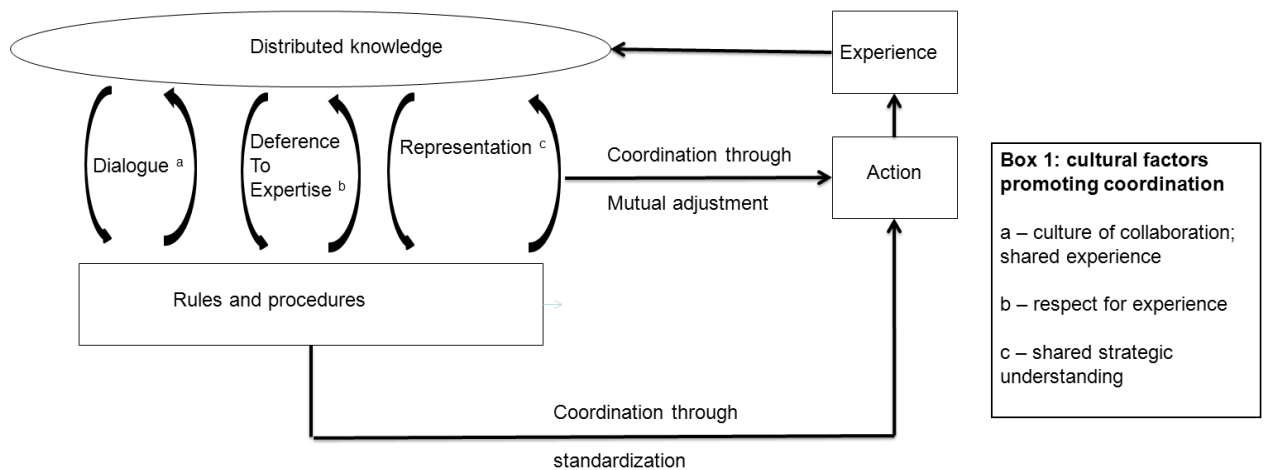
Core finding. In the case study of a central government department (case study two) the lack of a shared understanding of the purpose and function of risk management undermined coordination of risk management practice, including coordination through standardization (rules and procedures). This finding suggests that establishing a shared understanding of the strategic purpose and role of risk management contributes to coordination of risk management (through mutual adjustment) (Figure 5.2.).

5.6. The big picture: Interaction between social processes and rules during coordination

A strong theme across the three social processes identified (dialogue, deference to expertise and representation) is their interaction with rules and processes. None of the social processes occurred in isolation. Dialogue and deference to expertise both allowed local, experiential knowledge to be integrated with rules, thus facilitating coordination between operational and managerial staff (chapters 5.4., 5.5.1.). Participant's inability to coordinate behaviour through representation (Asch 1987) (due to lack of a shared strategic understanding) undermined coordination through rules and procedures by generating diverse perspectives of the purpose of formal risk management processes (chapter 5.5.2.). Therefore, the core finding arising from this research is that coordination through mutual adjustment emerged from the interaction between these three social processes (dialogue, deference to expertise and representing), rules and the knowledge distributed across an organisation (Figure 5.2.). The overall process is made cyclical by recognising that the experiences resulting from risk management practice are the basis on which knowledge is formed (Kolb 1984) (Figure 5.2.). A key insight illustrated in Figure 5.4. is the role of the three social processes as pathways by which experience of risk management practice can inform subsequent decision making and practice creating a possible pathway for organisational learning. Organisational learning is a key component of risk management maturity (Strutt et al. 2006). This is particularly interesting given the observed use of the three social processes to generate adaptive responses to dynamic or unpredictable risks (Tables 4.1.3., 4.1.4.). The relationship between the social processes identified in this research (Table 5.1.), adaptive risk management and organisational learning would be an interesting topic for future research.

Figure 5.2.: Depiction of the core findings derived from case studies researching coordination of risk management in a Power Utility and a Central Government Department.

Three social processes (dialogue, deference to expertise and representation) that affecting the coordination of risk management practice were identified. Through these processes organisational actors were able to integrate risk relevant knowledge that was distributed across organisational members and stakeholder groups. This facilitated coordination of risk management practice, particularly the adaptive, mutual adjustment associated with dynamic, unpredictable risks. Further, the ability of these social processes to generate coordinated behaviour was dependant on the cultural factors listed in ‘Box 1’.



5.7. Revisiting the literature review in light of results

In the literature review (chapter 2) it was hypothesised that coordinated risk management practice would first be achieved through codified rules and procedures (required for risk management maturity level 2 – Figure 2.3.) and then increasingly by embedding risk management in cultural factors (required for risk management maturity levels 3 and 4 – Figure 2.3.) (Chapter 2.6.). By identifying a number of cultural factors that contribute to the coordination of risk management (Table 5.1), this research supports the claim that achieving coordinated risk management is associated with embedding risk management in organisational culture in addition to codified rules and processes. However, the neat progression of cultural embedding progressing from espoused values to assumptions as coordination increases (Figure 2.2.) was not apparent in the findings of this research. Rather, the findings described a collection of social processes mediating the relationship between organisational culture and coordination of risk management practice (Table 5.1. and Figure 5.2.). The significant of these findings, developed in chapters 5.4. to 5.6., is to provide insight into the role of informal social processes and cultural factors in achieving pervasive risk management and high levels of risk management maturity.

Here that insight is summarised. This research described how the processes of dialogue, deference to expertise and representation (driven by respect for experience, a culture of collaboration and a shared strategic understanding) underpinned the coordination of risk management practice (chapters 5.4., 5.5., 5.6., and Figures 5.1., 5.2.). The coordination described was often adaptive, in the context of dynamic and unpredictable risks (chapter 4.2.2. and Tables 4.1.4., 4.1.5). In case study one of a

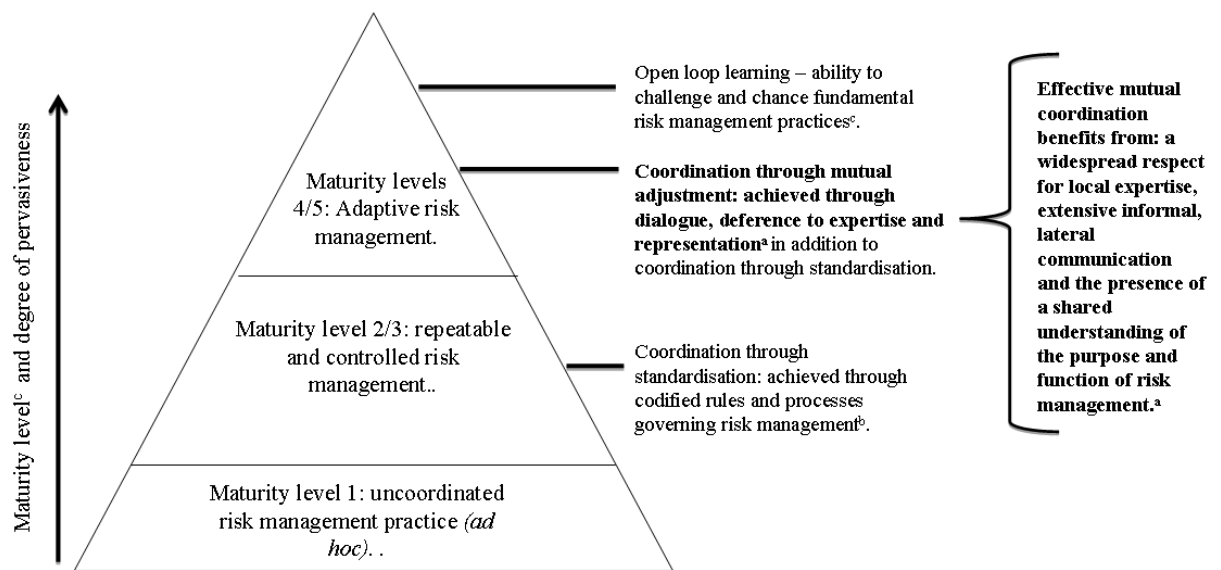
power utility, dialogue and deference to expertise were means to access local, experiential knowledge that was used to adapt rules and procedures to specific contexts in a coordinated manner (chapters 4.2.1., 4.2.3.2. and Tables 4.1.1., 4.1.5.).

In case study two of a central government department, informal, lateral communication integrated the wide range of knowledge sources relating to environmental risks involving multiple stakeholders and perspectives (chapter 4.2.3.2. and Table 4.2.1.). Coordination of this nature, where actors mutually adapt to each other's changing needs, is termed coordination through mutual adjustment (Mintzberg 1979). As observed in this research (chapters 5.4., 5.5.), coordination through mutual adjustment is underpinned by the integration of knowledge through communication (knowledge transfer) (Grant 1996; Carlile 2004). Knowledge transfer and integration are essential to coordination through mutual adjustment, because, without up-to-date understanding of how their actions will impact others and their environment, actors are not able to coordinate their actions in a dynamic environment (Asch 1987).

Drawing these findings together, this research suggests that as risks become more complex and require adaptive risk management, the cultural factors and social processes identified (Table 5.1.) become increasingly important as they underpin an important means of adaptive behaviour in organisations: coordination through mutual adjustment (Mintzberg 1979). Given that adaptive risk management is a requisite for risk maturity levels four and five (Strutt et al. 2006), the social processes and cultural factors identified in this research (Table 5.1.) contribute to achieving those maturity levels (Figure 5.3). Thus, a core contribution of this research is to expand understanding of risk management maturity and what is required to achieve a high level of risk maturity.

Further, the relationship between consistent and coordinated risk management and dialogue, deference to expertise and a culture of collaboration described in this research provides a possible explanation for the correlation observed by Kimbrough and Compton (2009) between organic organisation cultures and successful implementation of enterprise risk management. Organic cultures (Deshpande et al. 1993) are characterised by collaboration, lateral communication and flexible patterns of behaviour. Thus, the findings of this research suggest that by facilitating knowledge transfer of specific knowledge and the purpose of risk management, these attributes of organic cultures enable implementation of enterprise risk management by ensuring that risk management procedures reflected operational realities and that operational staff and stakeholders bought-in to risk management because they understood why it was being done.

Figure 5.3.: The relationship between coordination through mutual adjustment and risk maturity. *The case studies of a Power Utility and a Central Government Department revealed that adaptive risk management was at least partially achieved by coordination through mutual adjustment. In turn coordination through mutual adjustment was achieved through social processes of dialogue, deference to expertise and representation. Adaptive risk managed is a requirement of the highest levels of risk management maturity (levels 4 and 5) (Strutt et al. 2006).*



^a see chapters four and five.

^b see chapter two.

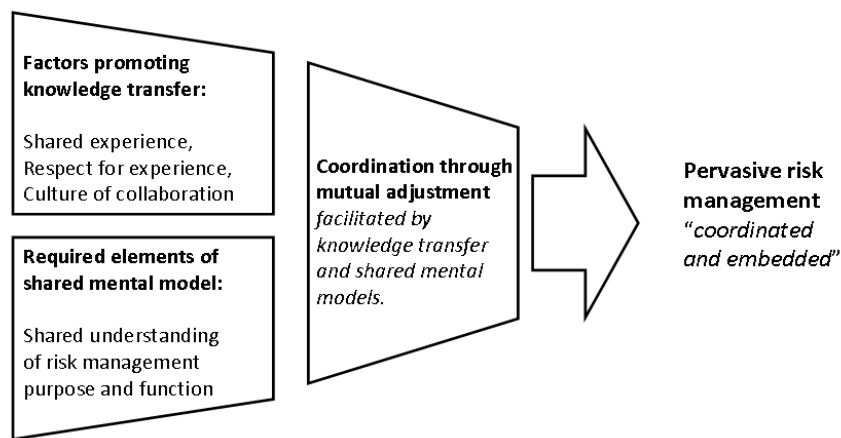
^c Strutt et al. (2006)

6. Conclusion and summary

This thesis describes the cultural and social attributes of two organisations that affected their ability to achieve pervasive risk management (Table 5.1. and Figures 5.2., 5.3.). The core findings of two case studies are as follows:

- Shared experience, respect for experience, a culture of collaboration, and shared strategic understanding of the purpose and function of risk management are cultural factors that contributed to achieving pervasive risk management (Table 5.1.)
- Those cultural factors affected pervasiveness through the social processes of dialogue, deference to expertise and representation (Figure 5.2.), which are mechanisms for the integration of the knowledge distributed across organisations and their stakeholders. This contributes to the coordination of risk management through mutual adjustment (Figure 6.1.).
- These social processes did not occur in isolation but interacted with rules and procedures (that coordinate risk management through standardization) (Figure 5.2.).
- The social processes and cultural factors identified (Table 5.1. and Figure 5.2.) contribute to organisational ability for adaptive risk management (Figure 5.3), a requisite for maturity levels 4 and 5 (Strutt et al. 2006).

Figure 6.1: Cultural and social factors that affect coordination of risk management practice through mutual adjustment. *Shared experience, respect for experience, a culture of collaboration, and shared strategic understanding of the purpose and function of risk management are cultural factors that contribute to achieving pervasive risk management. They do this by facilitating coordination through mutual adjustment (Mintzberg 1979) by promoting knowledge transfer and shared mental models between organisational actors and stakeholders.*



Summary of core argument. Here the core findings and conclusions of this thesis, with reference to the relevant literature, are summarised. Pervasive risk management, defined as risk management that is widely embedded and coordinated, is a core element of risk maturity (Chapter 2.2.). Mechanisms for the coordination of risk management practice addressed in risk maturity models and enterprise risk management emphasise centralised control, formal rules and codified procedures (Chapter 2.3.). These coordination mechanisms are example of ‘coordination through standardization’ (Mintzberg 1979). Coordination through standardization is sufficient where tasks are well understood and relatively stable (Mintzberg 1979). However, given the prevalence of risks characterised by uncertainty, ambiguity (Klinke & Renn 2002) and variability (Vaughan & Seifert 1992; Siu 1994) this is problematic. A significant body of literature contends that organisations should utilise less rigid modes of coordination in order to achieve better risk management performance in dynamic and uncertain environments (Bigley & Roberts 2001; Faraj & Xiao 2006; Kelly 2009). This is reflected in the highest level of risk maturity, adaptive, that is characterised by open-loop learning (Strutt et al. 2006). The logic behind this is that organisations must be adaptive in order to respond to the unexpected and therefore, cannot rely only on standardized responses to risks.

Coordinated behaviour that remains adaptive to a changing situation requires that the coordinating actors communicate their changing interdependencies to each other (Carlile 2004) and use shared mental models to predict changing interdependencies where communication is limited (Mathieu et al. 2000). This process of adaptive coordination based on knowledge transfer and common knowledge is termed ‘coordination through mutual adjustment’ (Mintzberg 1979; Thompson 1967).

However, the requirement for adaptability when managing risk in complex environments does not replace the requirement for coordination through standardization but requires additional coordination mechanisms that are more flexible (Bigley & Roberts 2001; Faraj & Xiao 2006).

This thesis builds on the claim that achieving pervasive risk management in complex environments requires coordination by mutual adjustment and cannot be achieved through standardised processes and outcomes alone (Bigley & Roberts 2001; Weick 2005; Faraj & Xiao 2006). The novel contribution of this thesis is to describe some of the social processes and cultural factors involved in coordination of risk management through mutual adjustment (Chapter 5. and Figures 5.2., 6.1 and Table 5.1.). In both case studies it was observed that when supported by specific cultural factors that aligned with risk management goals these social processes facilitated coordination through mutual adjustment and thus, contributed to achieving pervasive risk management (Table 5.1. and Figure 5.2.). In case study one of a power utility (chapters 4.2. and 5.1.), shared common experience and respect for experience facilitated the sharing and utilisation of experience in risk-based decisions through dialogue and deference to expertise, contributing to organisation ability to coordinate risk management practice and enriching the knowledge informing risk-based decisions. In case study two of a central government department (chapters 4.4. and 5.2.), a culture of collaboration encouraged widespread informal, lateral communication that played an important role in accessing and integrating the wide range of knowledge relevant to managing environmental risks. Further, in case study two (chapters 4.5., 5.3.), the lack of a common understanding of what risk management was for (purpose) and how it achieved that purpose (function) resulted in

uncoordinated risk management. These findings describe two organisations and cannot be assumed to be generally true of other organisations. However, the underlying processes of knowledge transfer and shared mental models are thought to be fundamental to coordinating action in all teams and organisations (Mintzberg 1979; Mathieu et al. 2000; Carlile 2004). Therefore, because the social processes and cultural factors identified in this thesis (Table 5.1.) affect knowledge transfer and shared mental models it is reasonable to hypothesise that they may affect risk management pervasiveness in other organisations. In summary, shared experience, respect for experience, a culture of collaboration and a common understanding of the purpose and function of risk management all contributed, through the social processes of dialogue, deference to expertise and representation, to the ability of the organisations researched to generate the adaptive and coordinated behaviour required for mature risk management in complex environments (Figures 5.2., 5.3.).

6.1. Summary of novelty

The novel contribution of this research as described in the previous section and chapter 5 is briefly summarised as follows:

- The research provides a **close description of the heterogeneity and disjointed nature of risk management practice** within the two case studies. This provides empirical of the importance of coordination to achieve pervasive risk management.
- The research identified a number of **social processes and associated cultural factors** that affected the ability of the two organisations studied to **achieve consistent and coordinated risk management practices**. The social processes identified are: **dialogue, deference to expertise and representation**. The cultural factors identified are: **shared experience, respect for experience, a culture of collaboration and a shared strategic understanding**. The method of coordination is identified as **coordination through mutual adjustment**. The findings also expand understanding of the role of one of the social processes, **deference to expertise**, from allocation of decision rights to also include coordination. The social processes identified represent possible **causal links between risk culture and pervasive risk management**. Thus, they contribute to the debate on the balance between standardisation and social process to achieve pervasive risk management.
- The research identifies and develops a **general mechanism** by which the social processes identified facilitated coordination: the **integration of distributed knowledge**, including experiential and tacit knowledge.

- The research **identifies a relationship between coordination through mutual adjustment and organisational ability to adapt to a dynamic and unpredictable risk environment.** This expands understanding of the organisational attributes required for maturity levels four and five (Strutt et al. 2006b) and, together with the social processes and cultural factors identified, **contributes to a richer description of organisational risk management maturity.**

6.2. Implications for risk management

There has been a trend in risk management towards an emphasis on bureaucratic processes and control through internal audit to coordinate risk management across organisations (Fraser & Henry 2007; Arena et al. 2010). However, the findings of this thesis have illustrated how informal social processes and cultural factors relating to knowledge transfer and shared mental models can play a key role in coordinating risk management practice (Figure 6.1.), particularly when risks are dynamic and uncertain (Figure 5.3.). Critically, this thesis found that those informal social processes also affected risk management practice coordinated by formal rules and processes (Figure 5.2.). The implication for risk management is that achieving pervasive risk management that is coordinated and consistent across an organisation, cannot always be achieved through codified processes and internal control alone. Therefore, those attempting to achieve pervasive risk management can not only rely on embedding risk management in codified processes and explicit rules, but also in the shared mental models and social processes of knowledge transfer identified (Table 5.1.). Briefly, this thesis suggests that to achieve pervasive risk management it is necessary, but not sufficient, for risk managers to ensure local expertise is valued, knowledge is shared laterally across their organisation and that a shared understanding of risk management's purpose is established and maintained.

6.2. Self-assessment

The following three questions were compiled as a short self assessment for risk management practitioners or auditors to assess the extent to which an organisation displays a capability for adaptive and coordinated risk management, based on the social processes and cultural factors identified in this research (Figure 5.2. and Table 5.1.).

1. Do employees regularly break or bend rules in order to achieve risk management objectives?

If employees regularly have to bend or break rules to meet risk management objectives, for example to maintain personal safety, then it is possible that dialogue between operational and managerial staff is insufficient. An active dialogue between operational staff and managerial staff is required to develop and adapt rules to either more specifically meet risk management objectives or to allow more flexible behaviour depending on the dynamism and complexity of the risk environment. Effective dialogue requires that managerial staff have sufficient experience to understand the operational reality that rules and procedures are intended to be applied in.

2. Are projects often revised at an advanced stage due to new information brought to light by colleagues or stakeholders?

This may be indicative of insufficient lateral communication within the organisation and with stakeholders. If those managing risks do not put considerable effort into identifying and communicating with relevant persons or groups at an early stage in

projects they cannot be reasonably claim to have A) consulted all persons with relevant expertise and, B) identified potential conflicts of interest with other organisational groups or external stakeholders. In addition to formal requirements to consult, establishing an expectation that project managers must engage and collaborate with peers and stakeholders is important to encourage lateral communication. Such a normative pressure, or culture of collaboration, will encourage the rich network of informal communication that can proactively identify relationships both within an organisation and external with stakeholders.

3. In novel or unexpected circumstances, do employees retain a sense of purpose and act according to the core values of the organisation?

If employee response to novel or unexpected circumstances tends to diverge from risk management objectives and core values, there is likely to be a conflict between risk management and cultural norms or underlying assumptions. For example, if employees do not adapt their routine behaviour to meet rare or unusual customer requirements not covered by existing procedure or rules. In this situation, the problem is not with the rules and procedures, which are adhered to in normal circumstances, but rather the lack of a shared understanding of the purpose of risk management and how risk management contributes to organisational objectives. Establishing and communicating a clear vision of the role that risk management plays in achieving strategic objectives is important for coordinating risk management practice, particularly in unusual circumstances not addressed by established rules and procedures.

7. Critical review of research

The most obvious limitation of this research is the degree to which the findings can be confidently generalised beyond the two case study organisations. This is an intrinsic feature of the qualitative, theory building methodology employed for this research. Data was collected in two organisations, which does not make a strong case for statistical generalisation to a wider population of organisations. However, statistical generalisation was never the intention of this research, which instead aimed to develop an in-depth understanding of a target phenomena (Denscombe 2007), in this case risk management pervasiveness, and in doing so contribute to a theoretical understanding of how organisations achieve pervasive risk management. Further, the concepts and knowledge developed through case studies can be generalised through further research (Gummesson 1991): through *analytic* generalisation the findings developed from these two case studies can be used as a comparison or guide in future case studies (Yin 2008).

The narrow focus of this research on two organisations is balanced against the deep access to those organisations that was achieved. Thus, rather than only interviewing risk managers or other senior managers as done by the surveys by the Economist and AON (AON 2007; Economist Intelligence Unit 2009), this research was able to capture the knowledge of individuals from a wide range of roles and seniority in each organisation. In addition, the case study method allowed the research to draw on a wider range of data sources, for example document analysis and observation, to gain contextual knowledge relevant to the phenomena of interest. Thus, while external generalizability is weak, internal validity is strong, *i.e.* the research offers a credible

and in-depth understanding of how these two organisations coordinated their risk management activities.

By conducting two case studies in different organisation that were both attempting to achieve pervasive risk management the research allowed a cross case analysis that identified some common themes. Both organisations met the case study criteria of being large organisation attempting to achieve pervasive risk management, however, they also had considerable differences. Therefore, while any common themes identified can be treated with more confidence from those identified in a single case study, care must be taken not to loose sight of the differences between the organisations. For example, while dialogue emerged as a strong common theme in both organisations, in the power utility it was predominantly vertical while in the central government department it was predominantly horizontal. Therefore, as the concepts developed in this research are tested or refined in further research (analytical generalisation) it will be important to retain the organisation specific findings.

A further limitation of this thesis is that the research method did not have a strong longitudinal aspect (it did not gather data over a long time period – data gathering occurred over a period less than one year in each organisation). For this reason the research was not able to gain insight into how risk management practices can become persistent (over time). The literature review (chapter 2.) suggested that embedding a common set of cultural factors in an organisation may contribute to achieving persistent risk management. Therefore, a longitudinal study exploring how organisations can achieve risk management that is not only pervasive but also sustained would be an interesting future research project.

Researcher bias is a key concern associated with this form of research. In order to minimise this risk, developing results and conclusions were regularly checked with peers and colleges. More developed results were also checked by peers (who had not been previously involved in the research) and by members of the case study organisations. Further, the grounded theory method of constant comparison (Strauss & Corbin 1990) facilitated self-reflection on the part of the researcher to identify any bias in interpretation of the data.

An assumption underlying this research is that social processes (Burgess 2010) and structure (Giddens 1984) affect risk management practice. It is assumed that the social processes and cultural factors identified were, at least partially, responsible for the observed patterns of risk management practice. However, it could also be assumed that risk management practice affects social processes and organisational culture. Indeed strong constructivist conceptualisations of organisations place all generative actions at the level of individuals (Taylor & Van Every 2000). For example, MacGillivray et al. (2007) assumed that cultural factors indicative of mature risk management were a result of changing behaviour not *vice versa*. However, there is research evidence, based on in-depth and long term case studies, that organisational culture is a significant influence on risk management practice. Arena (2010) found that enterprise risk management frameworks, although ostensibly identical, resulted in different behaviour influenced by organisational culture. Howard-Grenville (2006) found that the distinct interpretations of risk by organisational subcultures could result in different behavioural responses to risk. Therefore, it is a reasonable assumption that

the social processes and cultural factors identified affected risk management practice, and one that merited investigation.

It is also necessary to recognise that while we are used a definitions of expertise and experience and expertise based on natural decision making (Klein 2008; Lipshitz et al. 2001; Hoffman 1996) wider definitions of experience are more diverse. For example, experience and expertise may be associated with ‘hands on experience’; age; scientific expertise and peer recognition to name a few (Nowotny, 2003). Therefore, exploring how experience and expertise are conceptualised in organisations and how this affected the use of knowledge through deference to expertise would be a worthwhile area of future research.

Finally, this research was not able to assess the influence of national cultures, as both case study organisations were in the UK. This might be an interesting topic for future research. In particular, achieving pervasive risk management in multi-national organisations that may contain strong subcultures would make fascinating research. However, given the depth of existing research on the affect of national culture on organisational behaviour care would have to be taken not to duplicate efforts.

7.1. Future research

Building on the critical review and the work presented in this thesis a number of possible future research topics have been identified:

- Conduct additional case studies in a wider variety of organisations, for example smaller and more risk seeking organisations, in order to further refine and test the findings of this thesis (Eisenhardt 1989). *Further case studies would follow a similar methodology to this research. Data generated could add to the findings of this research (refining the findings) for example identifying additional social processes or cultural factors involved. Further case study would also confirm or conflict with the findings of this research, strengthening or weakening the generalisability of those findings respectively.*
- A longitudinal study exploring the organisational factors involved in sustaining risk management capability. *This research did not identify factors related to the sustainability of pervasive risk management. The literature review (chapter 2) suggested that embedding risk management in organisational culture may affect the persistence of risk management behaviour. However, a longitudinal study over a period of years would be required to investigate this.*
- Investigating the effect of different national cultures on risk management pervasiveness. *This study was limited to case studies of UK based organisations. In order to 1) assess whether the findings apply to other national cultural contexts; 2) investigate the affect of national culture on risk management pervasiveness would require further case studies in organisations based in countries other than the UK.*
- Testing the generalisability of the findings using quantitative methodologies, for example a standardized survey encompassing a large sample of organisations. *A survey that tested for the presence of the social processes and cultural factors identified in this research, as well as assessments of risk*

management pervasiveness could be used to determine the generalisability of the findings. This will require operationalising the constructs and processes identified in this thesis. The limitations of such an approach would be an inability to take into account distinct organisational contexts and therefore, to identify other social processes and cultural factors involved.

- Given the role of experience and expertise in risk management identified in this research and the research of others (Weick et al. 1999) it would be interesting to explore how expertise was perceived in organisations and how that affected risk management capability. *Although this research clearly defined experience and expertise, how they are actually perceived in an organisation may have implication for risk management practice and capability. For example, it may be significant if expertise is equated simply with quantity of experience, or, if expertise is equated with formal qualification.*

Further, the following research questions have been identified that would build on this thesis and add to understanding of risk governance:

- *Does richness of informal communication affect organisational ability for proactive and adaptive risk management?*
- *How can organisations balance the benefits derived from allowing employees to use their expertise against the need for internal control and accountability to external stakeholders?*
- *How can organisations achieve sustained risk management capability?*

- *How can senior risk managers utilise the distributed expertise of organisational actors to inform strategic risk management decisions?*
- *How can informal communication within organisations be supported?*
- *How is expertise defined in an organisation and what affect does this have on risk management practice?*

References

- Aabo, T., Fraser, J. & Simkins, B., 2005. The rise and evolution of the chief risk officer: enterprise risk management at hydro one. *Journal of Applied Corporate Finance*, 17(3), pp.62–75.
- Agor, W.H., 1986. The logic of intuition: How top executives make important decisions. *Organizational Dynamics*, 14(3), pp.5–18.
- Agyris, C. & Schon, D., 1978. *Organizational learning: a theory of action perspective*, Reading, Mass: Addison Wesley.
- Ahrens, T. & Dent, D., 1998. Accounting and Organizations: Realizing the Richness of Field Research. *Journal of Management Accounting Research*, 10, pp.1–39.
- Amendola, A., 2002. Recent paradigms for risk informed decision making. *Safety Science*, 40(1-4), pp.17–30.
- Antonsen, S., 2009. The relationship between culture and safety on offshore supply vessels. *Safety Science*, 47, pp.1118–1128.
- AON, 2007. Enterprise Risk Management: The Full Picture.
- AON, 2011. Public Sector Practice: Forward-Thinking Risk Solutions for the Public Sector. Available at: http://www.aon.com/attachments/risk-services/Aon_PublicSectorBrochure_7-6-11.pdf [Accessed April 18, 2012].
- Arboleda, A. et al., 2003. Management practices as antecedents of safety culture within the trucking industry: similarities and differences by hierarchical level. *Journal of Safety Research*, 34, pp.189–197.

- Arena, M., Arnaboldi, M. & Azzone, G., 2010. The organizational dynamics of Enterprise Risk Management. *Accounting, Organizations and Society*, 35(7), pp.659–675.
- Asch, S.E., 1987. *Social psychology*, Oxford [Oxfordshire]; New York: Oxford University Press.
- Atkinson, A.C. & Shaffir, W., 1998. Standards for Field Research in Management Accounting. *Journal of Management Accounting Research*, 10, pp.41–68.
- Aven, T. & Steen, R., 2010. On the boundaries of probabilistic risk assessment in the face of uncertainties, a case of piracy and armed robberies against ships in the Gulf of Aden. *International Journal of Business Continuity and Risk Management*, 1(2), pp.113–124.
- Barnett, S.M. & Koslowski, B., 2002. Adaptive expertise: Effects of type of experience and the level of theoretical understanding it generates. *Thinking & Reasoning*, 8(4), pp.237–267.
- Bazeley, P., 2007. *Qualitative data analysis with NVivo*, Los Angeles ;London: SAGE.
- Beck, U., 2009. *Risk society : towards a new modernity*, London: Sage.
- Bierly, P.E., 1995. Culture and High Reliability Organizations: The Case of the Nuclear Submarine. *Journal of Management*, 21(4), pp.639–656.
- Bigley, G.A. & Roberts, Karlene H, 2001. The incident command system: high-reliability organizing for complex and volatile task environments. *Academy of Management Journal*, 44(6), pp.1281–1299.

- Boholm, A., Corvellec, H. & Karlsson, M. 2013. The practice of risk governance: lessons from the field. *Journal of Risk Research*, 15(1), pp. 1-20.
- Bollinger, A.S. & Smith, R.D., 2001. Managing organizational knowledge as a strategic asset. *Journal of Knowledge Management*, 5(1), pp.8–18.
- Bradach, J.M., & Eccles, R., 1989. The iron Laws of Flies: bureaucratic Failure and the Problem of Governance in the Chinese Economic Reforms. *Administrative Science Quarterly*, 33(4), pp.507-527.
- Brown, J. & Duguid, P., 1991. Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning, and Innovation. *Organisational Science*, 2(1), pp.40–57.
- Brown, J.S. & Duguid, P., 2001. Knowledge and Organization. *Organization Science*, 12(2), pp.198–213.
- Buchanan, David, 2012. Case studies in organizational research. In C. Cassell & G. Symon, eds. *Qualitative organizational research : core methods and current challenges*. London: SAGE.
- Burgess, E.W., 2010. *Introduction to the science of sociology*, Memphis, Tennessee: General Books.
- Burnaby, P. & Hass, S., 2009. Ten steps to enterprise-wide risk management. *Corporate Governance*, 9(5), pp.539–550.

- Cannon-Bowers, J., Salas, E & Converse, S., 1993. Shared mental models in expert team decision making. In J. Castellan, ed. *Current issues in individual and group decision making*. Hillsdale, NJ, USA: Erlbaum, pp. 221–246.
- Carlile, P.R., 2004. Transferring, Translating, and Transforming: An Integrative Framework for Managing Knowledge Across Boundaries. *Organization Science*, 15(5), pp.555–568.
- Charmaz, K., 2006. *Constructing Grounded Theory*, London: SAGE.
- Choudry, R., Dongping, F. & Mohamed, S., 2007. The nature of safety culture: a survey of the state-of-the-art. *Safety Science*, 45(10), pp.993–1012.
- Clarke, S., 1999. Perceptions of organizational safety: implications for the development of safety culture. *Journal of Organizational Behavior*, 20, pp.185–198.
- Cooper, M.D., 2000. Towards a model of safety culture. *Safety Science*, 36, pp.111–136.
- COSO, 2004. Enterprise risk management framework.
- Cox, S. & Flin, R, 1998. Safety culture: Philosopher's stone or man of straw? *Work & Stress*, 12(3), pp.189–201.
- Crandall, B., Klein, G.A. & Hoffman, R.R., 2006. *Working minds a practitioner's guide to cognitive task analysis*, Cambridge, Mass.: MIT Press. Available at: <http://www.books24x7.com/marc.asp?bookid=12926> [Accessed March 9, 2012].

- Cummins, D.J., Philips, R.D. & Smith, S.D., 1998. The rise of risk management. *Economic Review*, (Q 1), pp.30–40.
- Deloitte, 2006. The Risk Intelligent Enterprise ERM Done Right. *Risk Intelligence Series*, (1).
- Van Den Eede, G., Van de Walle, B. & Rutkowski, A., 2006. Dealing with risk in incident management: an application of high reliability theory. *Proceedings HICSS '06 Procedures of the 39th Annual Hawaii International Conference on Systems Sciences*, 2.
- Denscombe, M., 2007. *The good research guide for small-scale social research projects*, Maidenhead: Open University Press. Available at: <http://public.eblib.com/EBLPublic/PublicView.do?ptiID=316269> [Accessed March 15, 2012].
- Deshpande, R., Farley, J.U. & Webster, F.E., 1993. Corporate Culture, Customer Orientation, and Innovativeness in Japanese Firms: A Quadrant Analysis. *Journal of Marketing*, 57(1), p.23.
- Duodu, L. et al., 2003. Organisational maturity in business risk management: The IACCM Business Risk Maturity Model (BRM3).
- Economist Intelligence Unit, 2007. Best practice in risk management A function comes of age. *The Economist*.
- Economist Intelligence Unit, 2009. *Beyond box-ticking A new era for risk governance*, Economist Intelligence Unit.

- Eisenhardt, K.M., 1989. Building Theories from Case Study Research. *Academy of Management Review*, 14(4), pp.532–550.
- Elmiyeh, B. et al., 2004. Needle-stick injuries in the National Health Service: a culture of silence. *Journal of the royal society of medicine*, 97, pp.326–327.
- Ericsson, K.A., 2006. The Influence of Experience and Deliberate Practice on the Development of Superior Expert Performance. In N. Charness, P. Feltovich, & R. Hoffman, eds. *The Cambridge handbook of expertise and expert performance*. Cambridge; New York: Cambridge University Press, pp. 685–706.
- Ericsson, K.A. & Charness, N., 1994. Expert performance: Its structure and acquisition. *American Psychologist*, 49(8), pp.725–747.
- Faraj, S. & Xiao, Y., 2006. Coordination in Fast-Response Organizations. *Management Science*, 52(8), pp.1155–1169.
- FERMA, 2008. *FERMA risk management benchmarking survey - Keys to understanding the diversity of risk management practices in Europe*, Federation of European Risk Management Associations.
- Fischhoff, B., 1995. Risk Perception and Communication Unplugged: Twenty Years of Process. *Risk Analysis*, 15(2), pp.137–145.
- Flin, R et al., 2000. Measuring patient safety climate: identifying the common features. *Safety Science*, 34, pp.177–192.
- Fraser, I. & Henry, W., 2007. Embedding risk management: structures and approaches. *Managerial Auditing Journal*, 22(4), pp.392–409.

- Gadamer, H.-G., 1993. *Truth and method*, New York: Continuum.
- Gephart, R.P., Van Maanen, J. & Oberlechner, T., 2009. Organizations and Risk in Late Modernity. *Organization Studies*, 30(2-3), pp.141–155.
- Gheman, Jr, H.W., Admiral, U.S. Navy (retired), 2003. *Columbia Accident Investigation Board Report: Volume 1*, Government Printing Office.
- Gherardi, S. & Nicolini, D., 2000. The organizational learning of safety in communities of practise. *Journal of Management Inquiry*, 9, pp.7–18.
- Gherardi, S., Nicolini, D. & Odella, F., 1998. What do you mean by safety? Conflicting perspectives on accident causation and safety management in a construction firm. *Journal of Contingencies and Crisis Management*, 6, pp.202–213.
- Giddens, A., 1984. *The constitution of society : outline of the theory of structuration*, Cambridge [Cambridgeshire]: Polity Press.
- Glaser, B. & Strauss, A., 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*, New York: Aldine de Gruyter.
- Goodwin, J., 2004. A comparison of internal audit in the private and public sectors. *Managerial Auditing Journal*, 19(5), pp.640–650.
- Grabowski, M. & Roberts, K.H., 1996. Human and organizational error in large scale systems. *IEEE Transactions on Systems, Man, and Cybernetics - Part A: Systems and Humans*, 26(1), pp.2–16.

- Grandori, A., 1997. Governance Structures, Coordination Mechanisms and Cognitive Models. *The Journal of management and Governance*, 1, pp.29-47.
- Grant, R.M., 1996. Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17(Winter Special Issue), pp.109–122.
- Guldenmund, F.W., 2000. The nature of safety culture: a review of theory and research. *Safety Science*, 34, pp.215–257.
- Gummesson, E., 1991. *Qualitative Methods in Management Research*, Newbury Park Calif.: Sage.
- Hannan, M.T. & Freeman, J., 1984. Structural Inertia and Organizational Change. *American Sociological Review*, 49(2), p.149.
- Harris, S.G., 1994. Organizational Culture and Individual Sensemaking: A Schema-Based Perspective. *Organization Science*, 5(3), pp.309–321.
- Henwood, K. & Pidgeon, N., 2006. Grounded Theory. In G. M. Breakwell et al., eds. *Research methods in psychology*. London; Thousand Oaks, CA: Sage Publications, pp. 342–266.
- Herath, H. & Wijjyanayake, W., 2010. Modelling business readiness frameworks. *International Journal of Business Continuity and Risk Management*, 1(3), pp.211–221.
- Hillson, D., 1997. Towards a Risk Maturity Model. *The International Journal of Project and Business Risk Management*, 1(1), pp.35–45.

- HM Treasury, 2004. Risk Management - Principles and Concepts. Available at:
http://www.hm-treasury.gov.uk/d/orange_book.pdf [Accessed March 24, 2012].
- HM Treasury, 2009. Risk Management assessment framework: a tool for departments.
- Hoff, T. et al., 2004. A Review of the Literature Examining Linkages between Organizational Factors, Medical Errors, and Patient Safety. *Medical Care Research and Review*, 61(1), pp.3–37.
- Hoffman, R., 1996. How Can Expertise be Defined? Implications of Research From Cognitive Psychology. In R. Williams, W. Faulkner, & J. Fleck, eds. *Exploring expertise : issues and perspectives*. Edinburgh, Scotland: University of Edinburgh Press, pp. 81–100.
- Hopkins, A., 2002. *Safety Culture, Mindfulness and Safe Behaviour: Converging Ideas*, Canberra: National Research Centre for OHS Regulation.
- Hopkins, A., 2007. *The Problem of Defining High Reliability Organisations*, Canberra: National Research Centre for OHS Regulation.
- Howard-Grenville, J. A., 2006. Inside the “Black Box”: How Organizational Culture and Subcultures Inform Interpretations and Actions on Environmental Issues. *Organization & Environment*, 19(1), pp.46–73.
- Howard-Grenville, Jennifer A., 2005. The Persistence of Flexible Organizational Routines: The Role of Agency and Organizational Context. *Organization Science*, 16(6), pp.618–636.

- Hulett, D.T. & Hillson, D., 2002. Not just a four-letter word anymore: project “risk” includes opportunities. *Cutter IT Journal*, 15(2), pp.4–10.
- ICAEW, 1999. *Internal control - Guidance for directors on the combined code [Turnbull report]*., Institute of Chartered Accountants in England and Wales.
- IRGC, 2009. *Risk Governance Deficits: An analysis and illustration of the most common deficits in risk governance*, International Risk Governance Council.
- IRGC, 2005. *Risk Governance: Towards an Integrative Approach*, Geneva: International Risk Governance Council.
- Jensen, M.C. & Meckling, W.H., 1995. Specific and General Knowledge, and Organizational Structure. *Journal of Applied Corporate Finance*, 8(2), pp.4–18.
- Johns, G., 2006. The essential impact of context on organizational behaviour. *Academy of Management Review*, 31(2), pp.386–408.
- Johnson, G., 1992. Managing Strategic Change - Strategy, Culture and Action. *Long Range Planning*, 25(1), pp.28–36.
- Jonkman, S., 2003. An overview of quantitative risk measures for loss of life and economic damage. *Journal of Hazardous Materials*, 99(1), p.30.
- Kelle, U., 2005. “Emergence” vs. “Forcing” of Empirical Data? A Crucial Problem of “Grounded Theory” Reconsidered. *Forum: Qualitative Social Research Sozialforschung*, 6(2), p.Art. 27.

- Kelly, P., 2009. Conceptualising business risk culture: a study of risk thinking and practice in contemporary dynamic organisations. *International Journal of Business Continuity and Risk Management*, 1(1), p.19.
- Kimbrough, R.L. & Compton, P.J., 2009. The Relationship Between Organizational Culture and Enterprise Risk Management. *Engineering Management Journal*, 21(2).
- Kleffner, A.E., Lee, R.B. & McGannon, B., 2003. The Effect of Corporate Governance on the Use of Enterprise Risk Management: Evidence From Canada. *Risk Management & Insurance Review*, 6(1), pp.53–73.
- Klein, G., 2008. Naturalistic Decision Making. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 50(3), pp.456–460.
- Klinke, A & Renn, O, 2002. A New Approach to Risk Evaluation and Management: Risk-Based, Precaution-Based, and Discourse-Based Strategies. *Risk Analysis*, 22(6), pp.1071–1095.
- Klinke, Andreas & Renn, Ortwin, 2012. Adaptive and integrative governance on risk and uncertainty. *Journal of Risk Research*, 15(3), pp.273–292.
- Knudsen, F., 2009. Paperwork at the service of safety? Workers' reluctance against written procedures exemplified by the concept of Seamanship. *Safety Science*, 47, pp.295–303.

- Kolb, D.A., 1984. The Process of Experiential Learning. In *Experiential learning : experience as the source of learning and development*. Upper Saddle River, N.J.: Prentice-Hall, pp. 19–38.
- Labov, W., 1971. The Study of Language in its Social Context. In J. A. Fishman, ed. *Advances in the sociology of language Vol. I, Basic concepts, theories and problems : alternative approaches*. The Hague: Mouton, pp. 152–216.
- Lenkus, D., 2001. Enterprising risk manager. *Business Insurance*, 35, pp.1–6.
- Leveson, N. et al., 2009. Moving Beyond Normal Accidents and High Reliability Organizations: A Systems Approach to Safety in Complex Systems. *Organization Studies*, 30(2-3), pp.227–249.
- Lincoln, Y.S. & Guba, E.G., 1985. *Naturalistic inquiry*, Beverly Hills, Calif.: Sage Publications.
- Lipshitz, R. et al., 2001. Taking stock of naturalistic decision making. *Journal of Behavioral Decision Making*, 14(5), pp.331–352.
- Locke, K., 2001. *Grounded theory in management research*, London; Thousand Oaks, Calif.: Sage Publications.
- Lounsbury, M., 2008. Institutional rationality and practice variation: New directions in the institutional analysis of practice. *Accounting, Organizations and Society*, 33(4-5), pp.349–361.
- MacGillivray, B.H. et al., 2007. Benchmarking Risk Management Within the International Water Utility Sector. Part I: Design of a Capability Maturity Methodology. *Journal of Risk Research*, 10(1), pp.85–104.

- MacGillivray, B.H. & Pollard, S.J., 2008. What can water utilities do to improve risk management within their business functions? An improved tool and application of process benchmarking. *Environment International*, 34(8), pp.1120–1131.
- Maitlis, S., 2005. The Social Processes of Organizational Sensemaking. *Academy of Management Journal*, 48(1), pp.21–49.
- Mathieu, J.E. et al., 2000. The influence of shared mental models on team process and performance. *The Journal of applied psychology*, 85(2), pp.273–283.
- Mearns, K. et al., 1998. Measuring safety climate on offshore installations. *Work & Stress*, 12(3), pp.238–254.
- Mearns, K.J. & Flin, Rhona, 1999. Assessing the State of Organizational Safety Culture or Climate? *Current Psychology*, 18(1), pp.5–17.
- Mikes, A., 2009. Risk management and calculative cultures. *Management Accounting Research*, 20(1), pp.18–40.
- Mintzberg, H., 1979. *The structuring of organizations*, Englewood Cliffs, N.J.: Prentice-Hall.
- Moynihan, D.P. & Landuyt, N., 2009. How Do Public Organizations Learn? Bridging Cultural and Structural Perspectives. *Public Administration Review*, 69(6), pp.1097–1105.
- Mutafelija, B. & Stromberg, H., 2003. *Systematic Process Improvement Using ISO 9001: 2000 and Cmmi*, Norwood, MA: Artech House.

- Neuman, W.L., 2011. *Social research methods : qualitative and quantitative approaches*, Boston: Pearson.
- Nowotny, H., 2003. Democratising expertise and socially robust knowledge. *Science and Public Policy*, 30, pp. 151–156.
- Ouchi, W.G., 1980. Markets, Bureaucracies and Clans. *Administrative Science Quarterly*, 25, pp.129-141.
- O’Leary, Z., 2010. *The essential guide to doing your research project*, Los Angeles: Sage.
- OGC, 2007. *Management of Risk: Guidance for Practitioners* 2nd Impres., Norwich: The Stationery Office.
- OGC & HM Treasury, 2003. *Managing risks with delivery partners*, London.
- Osborne, D. & Gaebler, T., 1993. *Reinventing government : how the entrepreneurial spirit is transforming the public sector.*, New York: New American Library.
- Osborne, S.P., 2000. *Public-private partnerships : Theory and practice in international perspective.*, London: Routledge.
- Paulk, M.C. et al., 1993. *Capability Maturity ModelSM for Software, Version 1.1*, Pittsburgh, Pennsylvania: Software Engineering Institute, Carnegie Mellon University.
- Pearce, W.B. & Littlejohn, S.W., 1997. *Moral conflict : when social worlds collide*, Thousand Oaks, Calif.: Sage Publications.

- Perrow, C., 1999. *Normal accidents : living with high-risk technologies*, Princeton N.J.: Princeton University Press.
- Pidgeon, N.F., 1991. Safety Culture and Risk Management in Organizations. *Journal of Cross-Cultural Psychology*, 22(1), pp.129–140.
- Pidgeon, N.F. & O’Leary, M., 2000. Man-made disasters: why technology and organizations (sometimes) fail. *Safety Science*, 34, pp.15–30.
- Plant, K.L. & Stanton, N.A., 2012. Why did the pilots shut down the wrong engine? Explaining errors in context using Schema Theory and the Perceptual Cycle Model. *Safety Science*, 50(2), pp.300–315.
- Polanyi, M., 1966. *The Tacit Dimension*, New York: Anchor Day.
- Pollard, S.J. et al., 2002. Current Directions in the Practice of Environmental Risk Assessment in the United Kingdom. *Environmental Science & Technology*, 36(4), pp.530–538.
- La Porte, T., 1981. On the Design and Management of Nearly Error-Free Organizational Control Systems. In D. . Sills, C. . Wolf, & V. . Shelanki, eds. *Accident at Three Mile Island: The Human Dimension*. Boulder: Westview Press.
- Power, M. et al., 2009. Reputational Risk as a Logic of Organizing in Late Modernity. *Organization Studies*, 30(2-3), pp.301–324.
- Power, Michael, 2008. *Organized uncertainty : designing a world of risk management*, Oxford: Oxford University Press.

- Power, Michael, 2004. The risk management of everything. *The Journal of Risk Finance*, 5(3), pp.58–65.
- PriceWaterHouseCoopers, 2009. The Risk Culture Survey.
- PricewaterhouseCoopers LLP, 2004. Enterprise Risk Management — Integrated Framework Executive Summary.
- Prime Minister’s Strategy Unit, 2002. Risk: Improving Government’s Capability to Handle Risk and Uncertainty. Available at:
http://www.cabinetoffice.gov.uk/strategy/work_areas/risk/ [Accessed June 29, 2011].
- Province of British Columbia, 2012. Risk Management Guideline for the British Columbia Public Sector. Available at:
http://www.fin.gov.bc.ca/pt/rmb/ref/RMB_ERM_Guideline.pdf [Accessed April 18, 2012].
- Raab, M. & Johnson, J.G., 2007. Expertise-based differences in search and option-generation strategies. *Journal of Experimental Psychology: Applied*, 13(3), pp.158–170.
- Raz, A.E. & Fadlon, J., 2006. Managerial culture, workplace culture and situated curricula in organizational learning. *Organization Studies*, 27(2), pp.165–182.
- Reason, J., 2000. Human error: models and management. *British Medical Journal*, 320, pp.768–770.
- Renn, Ortwin, 2005. *Risk Governance Towards an Integrative Approach*, Geneva: International Risk Governance Council.

- Renn, Ortwin & Walker, K.D., 2008. *Global Risk Governance Concept and Practice Using the IRGC Framework*, Dordrecht: Springer Netherlands. Available at: <http://proxy1.athensams.net/athens?url=http://dx.doi.org/10.1007/978-1-4020-6799-0> [Accessed February 14, 2012].
- Richter, A. & Koch, C., 2004. Integration, differentiation and ambiguity in safety cultures. *Safety Science*, 42, pp.703–722.
- Roberts, K. H. & Rousseau, D.M., 1989. Research into nearly failure-free, high reliability organisations: having the bubble. *IEEE Transactions of Engineering Management*, 36(2), pp.132–139.
- Robinson, L.A. & Levy, J.I., 2011. The [R]Evolving Relationship Between Risk Assessment and Risk Management. *Risk Analysis*, 31(9), pp.1334–1344.
- Robson, C., 2002. *Real world research : a resource for social scientists and practitioner-researchers*, Oxford, UK; Malden, Mass.: Blackwell Publishers.
- Rogers, C.R., 1980. *A way of being*, Boston, MA: Houghton Mifflin.
- Rouse, W.B. & Morris, N.M., 1986. On looking into the black box: Prospects and limits in the search for mental models. *Psychological Bulletin*, 100(3), pp.349–363.
- Schein, E., 2004. *Organizational culture and leadership*, San Francisco: Jossey-Bass.
- Schein, E.H., 1986. Coming to a New Awareness of Organisational Culture. *Sloan Management Review*, 25(2), pp.3–16.

- Shannon, H., 1997. Overview of the relationship between organizational and workplace factors and injury rates. *Safety Science*, 26(3), pp.201–217.
- Short, J., 1984. The social fabric at risk: toward the social transformation of risk analysis. *American Sociological Review*, 49, pp.711–725.
- Shotter, J., 1993. *Conversational realities : constructing life through language*, London; Thousand Oaks, Calif.: Sage Publications.
- Siu, N., 1994. Risk assessment for dynamic systems: An overview. *Reliability Engineering & System Safety*, 43(1), pp.43–73.
- Slovic, P. et al., 2005. Affect, Risk, and Decision Making. *Health Psychology*, 24(4, Suppl), pp.S35–S40.
- Smircich, L., 1983. Concepts of Culture and Organizational Analysis. *Administrative Science Quarterly*, 28(3), pp.339–358.
- Sorensen, J.N., 2002. Safety culture: a survey of the state-of-the-art. *Reliability Engineering and System Safety*, 76, pp.189–204.
- SOX, 2002. Sarbanes-Oxley Act. Pub. L. 107-204. 116 Stat. 745. July 30, 2002. Print.
- Standard & Poor, 2007. Criteria: Summary Of Standard & Poor’s Enterprise Risk Management Evaluation Process For Insurers. *Ratings Direct*.
- Stewart, J.R., Zediker, K.E. & Witteborn, S., 2005. *Together : communicating interpersonally : a social construction approach.*, Los Angeles: Roxbury Pub. Co.
- Stirling, A., 1998. Risk at a turning point? *Journal of Risk Research*, 1(2), pp.97–109.

- Storey, J. & Buchanan, D, 2008. Healthcare governance and organizational barriers to learning from mistakes. *Journal of Health Organization and Management*, 22(6), pp.642–651.
- Stout, R.J. et al., 1999. Planning, Shared Mental Models, and Coordinated Performance: An Empirical Link Is Established. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 41(1), pp.61–71.
- Strauss, A. & Corbin, J., 1990. *Basics of Qualitative Research. Grounded Theory Procedures and Technique*, Newbury Park, CA: SAGE.
- Strebel, P. & Lu, H., 2010. Risk Management Starts at the Top. *Business Strategy Review*, 21(1), pp.18–23.
- Strutt, J.E. et al., 2006. Capability maturity models for offshore organisational management. *Environment International*, 32(8), pp.1094–1105.
- Summerill, C., Pollard, S.J.T. & Smith, Jennifer A., 2010. The role of organizational culture and leadership in water safety plan implementation for improved risk management. *Science of The Total Environment*, 408(20), pp.4319–4327.
- Tamuz, M. & Harrison, M., 2006. Improving Patient Safety in Hospitals: Contributions of High-Reliability Theory and Normal Accident Theory. *Health Services Research*, 41(4 part II), pp.1475–6773.
- Taylor, C., 2007. Is Managing Risk Culture a Part of ERM? *The RMA Journal. Philadelphia*, 89(5), pp.12–13.
- Taylor, J.R. & Van Every, E.J., 2000. *The emergent organization communication as its site and surface*, Mahwah, N.J.: Lawrence Erlbaum Associates. Available

at:

<http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=24284> [Accessed February 14, 2012].

The Green Book: appraisal and evaluation in central government, 2013. Accessed at:

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/179349/green_book_complete.pdf on 26/04/2013.

Thompson, J.D., 1967. *Organizations in action : social science bases of administrative theory*, New York: McGraw-Hill.

Thompson, F.J., Frances, J. & Mitchell, J. 1991. *Markets, Hierarchies and Networks: The Coordination of Social Life*. London: Sage.

Tsai, W., 2002. Social Structure of “Coopetition” Within a Multiunit Organization: Coordination, Competition, and Intraorganizational Knowledge Sharing. *Organization Science*, 13(2), pp.179–190.

Tsoukas, H., 2009. Craving for Generality and Small-N Studies: A Wittgensteinian Approach towards the Epistemology of the Particular in Organization and Management Studies. In David Buchanan & A. Bryman, eds. *The SAGE Handbook of Organizational Research Methods*. London: Sage, pp. 285–301.

Tsoukas, H., 2003. *The Oxford handbook of organization theory*, Oxford ; New York: Oxford University Press.

Tversky, A. & Kahneman, D., 1992. Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, 5(4), pp.297–323.

- Valencia, M., 2010. The gods strike back. *The Economist*.
- Vaughan, E. & Seifert, M., 1992. Variability in the Framing of Risk Issues. *Journal of Social Issues*, 48(4), pp.119–135.
- Victorian Auditor-General's Office, 2007. Managing Risk Across the Public Sector: Toward Good Practice. Available at:
http://download.audit.vic.gov.au/files/Managing_risk_report.pdf [Accessed April 24, 2012].
- Vogus, T.J. & Welbourne, T.M., 2003. Structuring for high reliability: HR practices and mindful processes in reliability-seeking organizations. *Journal of Organizational Behavior*, 24(7), pp.877–903.
- Vredenburg, A.G., 2002. Organizational safety: Which management practices are most effective in reducing employee injury rates? *Journal of Safety Research*, 33, pp.259–276.
- van Vuuren, W., 2000. Cultural influences on risks and risk management: six case studies. *Safety Science*, 34(1-3), pp.31–45.
- Walczak, S., 2005. Organizational knowledge management structure. *The Learning Organization*, 12(4), pp.330–339.
- Waring, J.J., 2005. Beyond blame: cultural barriers to medical incident reporting. *Social Science & Medicine*, 60, pp.1927–1935.
- Weick, K E, Sutcliffe, K.M. & Obstfeld, D., 1999. Organizing for High Reliability: Processes of Collective Mindfulness. In *Research in Organizational Behavior*. Stanford: Jai Press, pp. 81–123.

- Weick, K., 1995. *Sensemaking in organizations.*, Thousand Oaks: Sage.
- Weick, Karl E, 1969. *The social psychology of organizing*, Reading Mass; Menlo Park Calif. [etc.]: Addison-Wesley Publ. Comp.
- Weick, Karl E., 2005. Managing the Unexpected: Complexity as Distributed Sensemaking. In R. R. McDaniel & D. J. Driebe, eds. *Uncertainty and Surprise in Complex Systems*. Berlin/Heidelberg: Springer-Verlag, pp. 51–65. Available at: http://www.springerlink.com/index/10.1007/10948637_5 [Accessed December 22, 2011].
- Weick, Karl E., 2010. Reflections on Enacted Sensemaking in the Bhopal Disaster. *Journal of Management Studies*, 47(3), pp.537–550.
- Weick, Karl E. & Roberts, Karlene H., 1993. Collective Mind in Organizations: Heedful Interrelating on Flight Decks. *Administrative Science Quarterly*, 38(3), pp.357–381.
- Whyte, W.F., 1982. Interviewing in field research. In R. G. Burgess, ed. *Field research : a sourcebook and field manuel*. London; New York: George Allen and Unwin, pp. 111–22.
- Yin, R.K., 2008. *Case Study Research: Design and Methods*, London: SAGE.
- Younger, P.L., Coulton, R.H. & Froggatt, E.C., 2005. The contribution of science to risk-based decision-making: lessons from the development of full-scale treatment measures for acidic mine waters at Wheal Jane, UK. *Science of The Total Environment*, 338(1-2), pp.137–154.

Appendixes

List of appendixes

- A – coordination theory
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Appendix A: Coordination theory literature review

<Tables and figures are found after the references>

Coordination within organisations and teams is defined as managing the interdependencies between the actions of individuals and subgroups (Malone & Crowston 1994). This involves: identifying interdependencies (Carlile 2004); controlling actions of the coordinating actors (Grant 1996) and facilitating communication and decision making between the actors (Grant 1996; Carlile 2004).

Interdependencies are defined as situations where two or more actors must interact with each other in order to meet their goals (Litwak & Hylton 1962). Interdependencies fall into three basic types: *pooled*, *sequential*, and *reciprocal* (Table A.1.) (Thompson 1967). Pooled interdependence refers to a situation where the actors involved share a common resource or output but are otherwise independent. For example, where branches of an organisation operate independently but rely on the wider organisation for their success. Therefore, if one branch underperforms the whole organisation is threatened, thus threatening the other branches too (Thompson 1967). Sequential interdependence refers to a situation where the actors involved are in linear, non-symmetrical, producer-consumer relationships. For example, an assembly line where the outputs of one actor's actions form the inputs for another actor's actions and so forth (Thompson 1967). Reciprocal interdependence also describes a situation where one actor A's output becomes the input for actor B but now the relationship is cyclical, so actor B's output is also the input for actor A. For example, in the relationship between aircraft maintenance and flying crews, the maintenance crew's output is a flyable aircraft, which is the flying crew's input allowing them to

'produce' the maintenance crew's input: an aircraft needing servicing (Thompson 1967). These forms of interdependence are not mutually exclusive, rather reciprocal interdependence presumes the existence of sequential which presumes the existence of pooled (Thompson 1967). However, whether sequential or reciprocal interdependence is required depends on the complexity of the task, with reciprocal interdependence necessary for the most complex tasks (Thompson 1967; Weick 2005). For example, pooled and sequential interdependence is appropriate for tasks where the inputs and subtasks are sufficiently well known in advance that rules and plans to ensure those inputs and subtasks are carried out in a timely and appropriate manner can be made (Thompson 1967). However, where the task involves significant uncertainty, for example, identifying and responding to the emergence of a novel disease (West Nile virus) then reciprocal interdependence between multiple experts is required (Weick 2005).

Typologies of coordination mechanisms

Thompson: Thompson (1967) also described three types of coordination based on the work of March and Simon (1958) which he associates with different types of interdependence. The three forms of coordination identified by Thompson (1967) are *standardization*, *coordination by plan* and *coordination by mutual adjustment*.

Standardization refers to rules which constrain the actions of the coordinating actors. The rules must be internally consistent and appropriate for the situations they are applied to, therefore, the situations to which they apply must be relatively stable and not too diverse (Thompson 1967). Coordination by standardization is considered appropriate to pooled interdependence (Thompson 1967). Coordination by plan

entails creating schedules which control the actions of the interdependent actors (Thompson 1967). Thompson (1967) describes this as a more flexible form of coordination than standardization and associates it with sequential interdependence. Finally, coordination by mutual adjustment is defined by involving the transfer of *new* information between the interdependent actors and emphasises communication (Thompson 1967). Mutual adjustment is based on March and Simons (1958)'s 'coordination by feedback'. The greater the variability and unpredictability involved the more mutual adjustment is relied upon for coordination (Thompson 1967; March & H. Simon 1958). Mutual adjustment is associated with reciprocal interdependence (Thompson 1967). Thompson (1967) also notes that standardization, planning and mutual adjustment, in that order, are increasingly communication and decision making intensive and therefore, increasingly expensive for the organisation.

Mintzberg: Building on the work of Thompson (1967), Mintzberg (1979) produced a seminal work on the structure and coordination mechanisms of organisations.

Mintzberg (1979) identified five mechanisms of coordination: *mutual adjustment*, *direct supervision*, *standardisation of work*, *standardisation of outputs*, and *standardisation of skills* (Table A.2.; Figure A.1). Mintzberg (1979) places these coordination mechanisms on a continuum, as organizational work becomes more complex the appropriate coordination mechanism goes from mutual adjustment, to direct supervision, to standardisation (in the following order of preference; work, outputs then skills), before reverting back to mutual adjustment for the most complex tasks (Figure A.2). Mintzberg (1979) caveats this by stating that while organisations will favour one form of coordination over the others depending on task complexity, all organisations must use all five simultaneously. For example, even for relatively

simple tasks, such as assembly lines, that can be highly standardized, unpredictable events such as machine breakdowns or employee sickness require adaptive responses through leadership (direct supervision) and informal communication (mutual adjustment). We note that by 'task complexity' Mintzberg (1979) seems to be referring to aleatoric uncertainty causing the inability to predict all of the actions and interdependencies required for the task. Mintzberg (1979) gives the Apollo Eleven moon landing as an example of a complex task where, despite highly specialised division of labour, at the beginning of the task no-one knew exactly what was required to complete the task. Therefore, the specialists involved had to mutually adjust to each other as the task developed.

Grant: Grant (1996) identifies four main mechanisms for coordination: (1) *rules and directives*, defined as standards controlling the interactions between organisational members (Ven et al. 1976); (2) *sequencing*, defined as the organising of activities sequentially by time such that each actors inputs into the overall process at the correct time (Nonaka 1990); (3) *routines*, defined as stable yet varied patterns of behaviour that occur without formal rules and directives (Hutchins 1991; Pentland & Rueter 1994); and (4) *group problem solving and decision making*, defined as personal, interactive and communication-intensive integration of knowledge used for unusual, complex and important tasks (Galbraith 1973; Perrow 1967; Hutchins 1991).

Malone and Crowston: In their review of coordination theory, incorporating computer science, organisation theory and management science, Malone and Crowston (1994) identify eight different types of dependency and associate each with an appropriate coordination process (Table A.3.). However, Malone and Crowston

(1994) do state that their list is not exhaustive and that each coordination processes they identify represents a range of possible real world processes. For example, coordination managing the dependency arising from requiring a shared (and finite) resource (Table A.3.) may involve, setting rules such as ‘first come first served’, more complex rules establishing market-like bidding or direct supervision by management. They also give special attention to ‘*group decision making*’ and ‘*communication*’, which they describe as coordination processes in their own right and essential to almost all other forms of coordination (Malone & Crowston 1994). Group decision making is defined as a decision made by multiple individuals which can be achieved through authority (the leader decides); by voting; or by consensus (Malone and Crowston 1994). Regarding communication, Malone and Crowston (1994) briefly consider a syntactic issue (Carlile 2004), namely the need for a common language, for example email or computer conferencing, as a mechanism for transferring knowledge between individuals.

There is considerable overlap between the typologies of interdependencies and coordination mechanisms describes. In table A.3. we match the dependencies and coordination processes identified by Malone and Crowston (1994) with Thompson (1967)’s and Mintzberg (1979)’s typologies of interdependencies and coordination mechanisms respectively. In table C.4. we match Mintzerg (1979)’s types of coordination, Thomson (1967)’s typology of independencies and examples of coordination methods from Grant (1996) and Malone and Crowston (1994). However, we caveat tables A.3. and A.4. with the following observation. The relationship between coordination mechanism (Mintzberg 1979) and some dependencies varied according to the complexity of the task. For example, the coordination mechanisms

associated with coordinating a relatively simple task/subtask dependency (Malone and Crowston 1994) could be direct supervision (Mintzberg 1979) were one individual could decide the goal and allocate subtasks to achieve that goal. However, for more complex task/subtask dependencies, for example involving a complex manufactured product, a single supervisor could not coordinate the whole process and coordination required standardization (Mintzberg 1979). Finally, were the task is so complex (uncertain) that all subtasks cannot be identified *a priori*, such as for the Apollo eleven moon mission, then mutual adjustment through communication must be relied upon (Mintzberg 1979).

Mutual adjustment

Mutual adjustment is primarily used for coordination under conditions of uncertainty and complexity (Mintzberg 1979; Grant 1996). The flexible and adaptive coordination characteristic of mutual adjustment is achieved through two mechanisms, communication (or knowledge transfer) and shared mental models (shared knowledge) (Mintzberg 1979; Grant 1996; Mathieu et al. 2000). Communication is the favoured mechanism to integrating knowledge and making group decisions underpinning mutual adjustment (Mintzberg 1979; Grant 1996). However, where communication is constrained mutual adjustment occurs through shared mental models (Mathieu et al. 2000). We now review knowledge transfer and shared mental models in more detail.

Knowledge transfer / communication

‘Knowledge transfer’ requires particular attention as, in addition to being a method of coordination in itself it also plays a role in almost all other methods of coordination (Malone & Crowston 1994; Grant 1996). Knowledge transfer refers to the movement of knowledge from one part of an organisation to another (Szulanski 1996; Argote 1999). The transfer of knowledge between actors in an organisations underpins both communication (Carlile 2004) and the integration of knowledge to produce value (Grant 1996). Transferring knowledge is often expensive and difficult, therefore, the transfer of knowledge between organisational subgroups with different specialised knowledge (domain specific knowledge) is a key coordination challenge (Argote & Ingram 2000; Grant 1996; Carlile 2004).

Knowledge can be categorised as ‘*specific*’ and ‘*general*’ based to the ease with which it can be transferred. Specific knowledge is defined as knowledge that is costly to transfer from one individual to another (Jensen & Meckling 1995). It can take the form of idiosyncratic knowledge (Hayek 1945; Grant 1996) (knowledge routed in a particular context, for example in-depth knowledge of the personalities of key stakeholders); esoteric scientific knowledge (Jensen & Meckling 1995) (knowledge that although general in application is difficult to transfer due to the high level of background knowledge required); and tacit knowledge (Polanyi 1966; I. Nonaka & von Krogh 2009; I. Nonaka 1994) (knowledge which is grounded in practice and difficult to explicitly express, for example, expertise developed through many years of experience working with a particular technology). Specific knowledge is often difficult to aggregate without losing informational content, because it cannot be expressed in a common language without the removal of its defining feature:

information regarding “particular circumstances of time and place” such as location, time and quality (Hayek 1945; Jensen & Meckling 1995; Grant 1996). For this reason integrating distributed knowledge simply by transferring it to a centralised location can be inefficient when specific knowledge is involved (Jensen & Meckling 1995). Therefore, organisations that rely on specific knowledge to deliver value tend to devolve decision making to those who have the knowledge rather than attempt to aggregate it in a central location (Jensen & Meckling 1995).

General knowledge, also referred to as ‘*knowing about*’ or ‘*explicit knowledge*’, is defined by its relative ease of communication through codified symbols such as a written language or numbers (Grant 1996; Jensen & Meckling 1995) without the need for shared experience and practice (J. S. Brown & Duguid 2001). General knowledge can also be effectively aggregated, for example quantifiable knowledge on cash flows, sales, and inventories can be easily collected from multiple sources and meaningfully aggregated at a central location (Grant 1996). Issues involved in transferring general knowledge are syntactic, pertaining to establishing a common language to represent the knowledge and a means to transfer the knowledge, for example electronic mail or shared databases (Carlile 2004).

The transfer of knowledge between actors requires some level of common knowledge, defined as a shared body of knowledge that allows for communication between actors (Carlile 2004; Grant 1996). Common knowledge functions as a ‘cross boundary object’ that facilitates communication between individuals and groups with different knowledges (Carlile 2004). Common knowledge can take the form of a shared language or other symbolic communication; shared meaning, shared purpose (Carlile

2004), commonality of specialised (domain specific) knowledge or shared recognition of the specialised knowledge and skills other team members (Grant 1996). Thus, general knowledge is easily communicated because, by definition the requisite common knowledge (a shared language that effectively represents that knowledge) exists to effect its transfer (Grant 1996; Jensen & Meckling 1995; Carlile 2004). In contrast, creating or acquiring the common knowledge required to transfer specific knowledge is more difficult. For example, tacit knowledge is thought to be primarily transferred by either first translating it into explicit knowledge (Nonaka 1994) or limiting its transfer to within communities of practice whose members already share the necessary common knowledge, acquired through shared experiences and practice (Brown & Duguid 2001). The importance of common knowledge for effective communication explains the difficulty of transferring knowledge between functional groups within organisations, such as between engineers and finance departments, which have different specialised (domain specific) knowledge (Brown & Duguid 2001). Conversely, it also explains the ease at which knowledge can be transferred among professional bodies between organisations, for example between accountants or financial managers in different firms who already share specialised knowledge (Brown & Duguid 2001).

The key point is that knowledge transfer is an important aspect of the coordination required for complex tasks, particularly where novel knowledge and innovation are involved (Carlile 2004; Grant 1996). The reason that knowledge transfer is particularly important for complex tasks lies with the limitations of human cognition which mean that experts tend to be specialists (Grant 1996; Simon 1991). Therefore, for complex tasks that are not encompassed by any single expert's expertise (or

domain specific knowledge) the integration of the knowledge of multiple experts is required (Carlile 2004; Grant 1996; Weick 2005).

The expense and difficulty of transferring knowledge means that were possible (typically for tasks involving less novelty or innovation) organisations typically favour coordinating the actions of specialists rather than knowledge transfer (Grant 1996). However, integrating experts' knowledge through coordinating their actions requires that many of the interdependencies between those expert's specialisms are already known (Carlile 2004). Thus, when novel knowledge is involved, due to uncertainty or innovation, knowledge transfer becomes necessary in order to discover the interdependencies involved and generate the required new knowledge (Carlile 2004). In simple terms the group's actions must be flexible and adaptive in order to respond to the unexpected and therefore, cannot be standardized (Mintzberg 1979). Such reciprocal, flexible coordination based on knowledge transfer and common knowledge falls into the coordination category 'mutual adjustment' (Mintzberg 1979; Thompson 1967).

Shared mental models

Mental models are structured bodies of knowledge that determine how individuals interpret and interact with their environment (Mathieu et al. 2000). Mental models allow individuals to describe, explain and predict events in their environment by recognising relationships between objects in their environment and construct expectations on the likely result of those objects interacting (Rouse & Morris 1986). We use the term mental model to refer to a variety of similar concepts from physiology, sociology and psycho-sociology: schemata (Rentsch & Hall 1994;

Rentsch & Klimoski 2001); cause maps (Weick 1995); and representations (Asch 1987). Shared mental models refers to a situation where the individuals in a group have significant commonality between their mental models (Cannon-Bowers et al. 1993). Shared mental models are thought to be achieved through applying shared methodologies and engaging in shared activities (Dougherty 1992; J. Brown & Duguid 1991) or through the actions of individuals who can act as translators, enable the flow of knowledge between different groups (Hargadon & Sutton 1997).

Shared mental models have been used to explain team behaviour, particularly how teams respond to difficult tasks where communication is limited (Mathieu et al. 2000; Cannon-Bowers et al. 1993). In particular, the ability of teams to produce rapid, adaptive and coordinated behaviour without codified rules or plans is attributed to shared mental models (Hutchins 1990). Shared mental models are thought to allow group members to predict the actions and resource requirements, including information requirements, of their fellow group members and critically predict how their own actions may influence the wider group (Mathieu et al. 2000). This process occurs without the need for intense or constant communication (Stout et al. 1999). A typology of the types of shared mental model that facilitate coordinated team behaviour is described in Cannon-Bowers et al. (1993). They include shared understanding of the: technology used by the team; the task being undertaken and the roles and responsibilities, knowledge and skills of other team members (Cannon-Bowers et al. 1993). There is an overlap between knowledge transfer and shared mental models: shared mental models regarding communication channels and

teammate's knowledge and knowledge requirements will have an effect on the nature and efficacy of communication within the team (Grant 1996).

A similar concept to shared mental models, referred to as shared representations, also underpins theory describing coordination at an organisational scale in high reliability organisations (HROs) (Weick & Roberts 1993; Hutchins 1990; Asch 1987). Asch (1987) described the interactions between group members in terms of contribution (the individual's action), representation (the individual's conceptualisation of wider group's actions in relation to their action) and subordination (the modification of the individual actions in response to their representation of the group's joint action).

Coordinated group behaviour arises when individuals modified (subordinated) their actions (contributions) in line with a perception of the wider system of group actions (representation) that is broadly shared by group members (Asch 1987). In this way a shared mental model, or representation, of the group's wider activities is central to the group's ability to coordinate its actions. Weick and Roberts (1993) research into HROs builds on the work of Asch (1987), arguing that only when individuals within a group 'heedfully' represent, subordinate and contribute does the collective mindfulness characteristic of HROs emerge. Heedful is defined as action that is aware, attentive and conscientious (Weick & Roberts 1993; Ryle 1949). Collective mindfulness refers to adaptive and coordinated behaviour that is sensitive to the possibility of organisational failure (Weick et al. 1999). Weick et al. (1999) also argue that while a shared mental model of a groups wider activities is critical to coordination in HROs, this does not mean that all group members shared the *same* mental model. Rather, groups members mental models overlap, so that while each member does not conceptualise the whole system, overall, the majority of the system

is covered by the partially overlapping mental models of group members (Weick et al. 1999). Partially overlapping mental models forms the basis of the conceptualisation of organisations as loosely coupled systems, where the combined mental models of all actors within an organisation is more complex than any individual's mental model could be and is therefore, the basis for organisational ability to manage highly complex tasks (Orton & Weick 1990; Taylor & Van Every 2000). Weick et al. (1999) also emphasise that due to the dynamic nature of group activities in HROs, shared mental models are not static and that group members must remain constantly alert to the patterns of activities around them, something they call 'sensitivity to operations'. Together, these theories of mindfulness in HROs and team behaviour emphasise the importance of individual ability to conceptualise the wider system of joint action are part of, to the emergence of organisation-wide, coordinated behaviour.

In summary, mutual adjustment is achieved through communication of new knowledge and establishing shared mental models. This can be contrasted to coordination by standardisation which is achieved through controlling and integration actions (Grant 1996; Mintzberg 1979; Thompson 1967; Mathieu et al. 2000) (Table A.4.). However, the expense and difficulty of mutual adjustment means that where possible organisations coordinate practice through standardization while minimising the transfer of knowledge required (Grant 1996). For example, organisations tend to rely on standardized routines for coordination, only resorting to groups problem-solving in a crisis (Hutchins 1991). The general trend observed in organisations is that reliance on mutual adjustment increased with task complexity (Perrow 1967) and uncertainty (Galbraith 1973; Ven et al. 1976) (Table A.4.).

Note on managing conflicting interests

In some situations managing the interactions between organisational members is not only about communication but also about the conflicting interests of those actors (Carlile 2004; J. S. Brown & Duguid 2001). In these situations the problem is one of reconciling and subordinating conflicting interests (Lawrence & Lorsch 1967; Jensen & Meckling 1976). A substantive literature has been devoted to the issues of resolving goal conflicts (Lawrence & Lorsch 1967) and problems of agency such as goal divergence (Jensen & Meckling 1976). However, although clearly related to the issue of coordination, managing the disparate interests of organisational members is essentially an issue of cooperation rather than coordination (Grant 1996) and therefore, lies outside of the scope of this review.

References

- Argote, L., 1999. *Organizational learning : creating, retaining and transferring knowledge*, Boston, Ma: Kluwer Academic.
- Argote, L. & Ingram, P., 2000. Knowledge Transfer: A Basis for Competitive Advantage in Firms. *Organizational Behavior and Human Decision Processes*, 82(1), pp.150–169.
- Asch, S.E., 1987. *Social psychology*, Oxford [Oxfordshire]; New York: Oxford University Press.
- Brown, J. & Duguid, P., 1991. Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning, and Innovation. *Organisational Science*, 2(1), pp.40–57.
- Brown, J.S. & Duguid, P., 2001. Knowledge and Organization. *Organization Science*, 12(2), pp.198–213.
- Cannon-Bowers, J., Salas, E & Converse, S., 1993. Shared mental models in expert team decision making. In J. Castellan, ed. *Current issues in individual and group decision making*. Hillsdale, NJ, USA: Erlbaum, pp. 221–246.

- Carlile, P.R., 2004. Transferring, Translating, and Transforming: An Integrative Framework for Managing Knowledge Across Boundaries. *Organization Science*, 15(5), pp.555–568.
- Dougherty, D., 1992. Interpretive Barriers to Successful Product Innovation in Large Firms. *Organization Science*, 3(2), pp.179–202.
- Galbraith, J.R., 1973. *Designing complex organizations.*, Reading, Mass.: Addison-Wesley Pub. Co.
- Grant, R.M., 1996. Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17(Winter Special Issue), pp.109–122.
- Hargadon, A. & Sutton, R.I., 1997. Technology Brokering and Innovation in a Product Development Firm. *Administrative Science Quarterly*, 42(4), p.716.
- Hayek, F.A., 1945. The Use of Knowledge in Society. *The American Economic Review*, 35(4), pp.519–530.
- Hutchins, E., 1991. Organizing Work by Adaptation. *Organisational Science*, 2(1), pp.14–39.
- Hutchins, E., 1990. *The technology of team navigation*, Hillsdale, NJ, USA: L. Erlbaum Associates.
- Jensen, M.C. & Meckling, W.H., 1995. Specific and General Knowledge, and Organizational Structure. *Journal of Applied Corporate Finance*, 8(2), pp.4–18.
- Jensen, M.C. & Meckling, W.H., 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), pp.305–360.
- Lawrence, P.R. & Lorsch, J.W., 1967. Differentiation and Integration in Complex Organizations. *Administrative Science Quarterly*, 12(1), p.1.
- Litwak, E. & Hylton, L.F., 1962. Interorganizational Analysis: A Hypothesis on Coordinating Agencies. *Administrative Science Quarterly*, 6(4), p.395.
- Malone, T.W. & Crowston, K., 1994. The interdisciplinary study of coordination. *ACM Computing Surveys*, 26(1), pp.87–119.
- March, J. & Simon, H., 1958. *Organizations*, New York: John Wiley & Sons.
- Mathieu, J.E. et al., 2000. The influence of shared mental models on team process and performance. *The Journal of applied psychology*, 85(2), pp.273–283.
- Mintzberg, H., 1979. *The structuring of organizations*, Englewood Cliffs, N.J.: Prentice-Hall.
- Nonaka, I., 1994. A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, 5(1), pp.14–37.

- Nonaka, I. & von Krogh, G., 2009. Perspective--Tacit Knowledge and Knowledge Conversion: Controversy and Advancement in Organizational Knowledge Creation Theory. *Organization Science*, 20(3), pp.635–652.
- Nonaka, Ikujiro, 1990. Redundant, overlapping organization: A Japanese approach to managing the innovation process. *California Management Review*, 69(6), pp.96–104.
- Orton, J.D. & Weick, Karl E., 1990. Loosely Coupled Systems: A Reconceptualization. *The Academy of Management Review*, 15(2), p.203.
- Pentland, B.T. & Rueter, H.H., 1994. Organizational Routines as Grammars of Action. *Administrative Science Quarterly*, 39(3), p.484.
- Perrow, C., 1967. A Framework for the Comparative Analysis of Organizations. *American Sociological Review*, 32(2), p.194.
- Polanyi, M., 1966. *The Tacit Dimension*, New York: Anchor Day.
- Rentsch, J. & Hall, R., 1994. Members of great teams think alike: A model of team effectiveness and schema similarity among team members. In M. Beyerlein & D. Johnson, eds. *Advances in interdisciplinary studies of work teams: Theories of self-managing work teams*. Elsevier Science/JAI Press, pp. 223–261.
- Rentsch, J.R. & Klimoski, R.J., 2001. Why do 'great minds' think alike?: antecedents of team member schema agreement. *Journal of Organizational Behavior*, 22(2), pp.107–120.
- Rouse, W.B. & Morris, N.M., 1986. On looking into the black box: Prospects and limits in the search for mental models. *Psychological Bulletin*, 100(3), pp.349–363.
- Ryle, G., 1949. *The concept of mind*, Chicago: University of Chicago Press.
- Simon, H.A., 1991. Bounded Rationality and Organizational Learning. *Organization Science*, 2(1), pp.125–134.
- Stout, R.J. et al., 1999. Planning, Shared Mental Models, and Coordinated Performance: An Empirical Link Is Established. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 41(1), pp.61–71.
- Szulanski, G., 1996. Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal*, 17(1), pp.27–43.
- Taylor, J.R. & Van Every, E.J., 2000. *The emergent organization communication as its site and surface*, Mahwah, N.J.: Lawrence Erlbaum Associates. Available at:
<http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=24284> [Accessed February 14, 2012].
- Thompson, J.D., 1967. *Organizations in action : social science bases of administrative theory*, New York: McGraw-Hill.

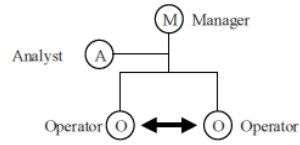
- Ven, A.H.V.D., Delbecq, A.L. & Koenig, R., 1976. Determinants of Coordination Modes within Organizations. *American Sociological Review*, 41(2), p.322.
- Weick, K E, Sutcliffe, K.M. & Obstfeld, D., 1999. Organizing for High Reliability: Processes of Collective Mindfulness. In *Research in Organizational Behavior*. Stanford: Jai Press, pp. 81–123.
- Weick, K., 1995. *Sensemaking in organizations.*, Thousand Oaks: Sage.
- Weick, Karl E., 2005. Managing the Unexpected: Complexity as Distributed Sensemaking. In R. R. McDaniel & D. J. Driebe, eds. *Uncertainty and Surprise in Complex Systems*. Berlin/Heidelberg: Springer-Verlag, pp. 51–65. Available at: http://www.springerlink.com/index/10.1007/10948637_5 [Accessed December 22, 2011].
- Weick, Karl E. & Roberts, K.H., 1993. Collective Mind in Organizations: Heedful Interrelating on Flight Decks. *Administrative Science Quarterly*, 38(3), pp.357–381.

Figure legend

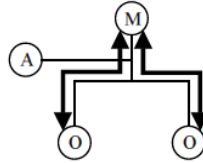
Figure A.1.: The five coordination mechanisms in organisations (Mintzberg 1979).
Figure A.2.: Mintzberg's coordination mechanisms along a continuum of task complexity (adopted from Mintzberg 1979).

Figure A.1.: The five coordination mechanisms in organisations (Mintzberg 1979).

Mutual adjustment:
Informal communication



Direct supervision:
One is responsible for others



Standardization of work
Standardization of outputs
Standardization of skills

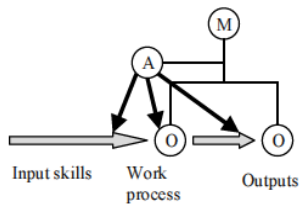
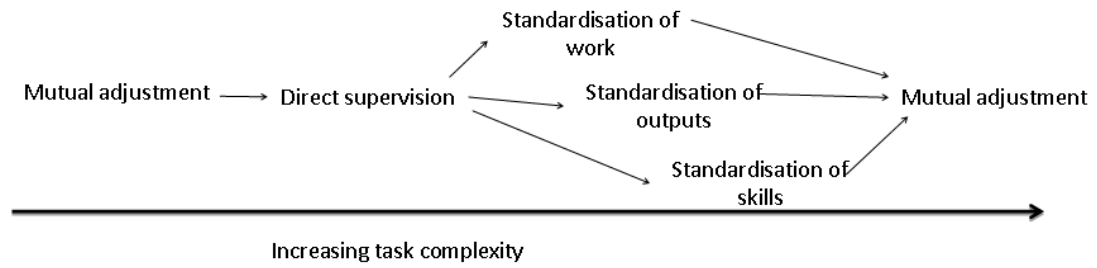


Figure A.2.: Mintzberg's coordination mechanisms along a continuum of task complexity (adopted from Mintzberg 1979).



Tables

Table A.1.: Thompson's interdependencies

Table A.2.: Coordination mechanisms (Mintzberg 1979)

Table A.3.: Synthesis of dependencies and associated coordination mechanisms.

Table A.4.: Synthesis of Mintzberg (1979)'s coordination mechanisms and interdependency.

Table A.1.: Thompson's interdependencies (Thompson 1967)

Interdependency	Description
Pooled	the activities produce common resources but are otherwise independent
Sequential	each activity depend on the completion of preceding activities
Reciprocal	each activity requires inputs from all other activities and produces outputs for all other activities

Table A.2.: Coordination mechanisms (Mintzberg 1979)

Coordination mechanism	Description
<i>Mutual adjustment</i>	Coordination through informal communication between peers without outside control. Control often lies with operational staff. Mutual adjustment is both used by the simplest organisations and for tasks involving the highest uncertainty.
<i>Direct supervision</i>	A single supervisor coordinates the work of subordinates through direct commands and monitoring their actions.
<i>Standardisation of work</i>	Coordination by specifying the work to be done. For example, specifying in great detail the action of workers on an assembly line.
<i>Standardisation of outputs</i>	Coordination by specifying the results of the work without specifying how those results should be achieved. For example, specifying the profit and growth levels expected of organisational divisions.
<i>Standardisation of skills</i>	Coordination by specifying the training, necessary for specific work. Therefore, employees have the skills and knowledge to carry out the appropriate actions and interactions for coordination. For example, an anaesthesiologist and a surgeon need only minimal communication because they already know what to expect of each other.

Table A.3.: Synthesis of dependencies and associated coordination mechanisms.

Dependency (Malone and Crowston 1994)	Example of coordination process for managing interdependency (Malone and Crowston 1994)	Interdependency (Thompson 1967)	Coordination Mechanism (Mintzberg 1979)
Shared resources	Resource allocation, for example first come first served.	Pooled	Direct supervision / standardization of work
Task assignments	Task allocation	Pooled / sequential	Direct supervision / standardization of work
Producer / consumer:			
Prerequisite constraints (<i>producer activity must be finished before consumer activity can begin</i>)	Notification, sequencing, tracking	sequential	Standardization of work
Transfer (<i>producer outputs must be delivered to consumer</i>)	Inventory management	sequential	Standardization of work
Usability (<i>producer output must be useable by consumer</i>)	Standardization	sequential	Standardization of outputs
	Participatory design, for example concurrent engineering	reciprocal	Mutual adjustment
Simultaneity constraints (<i>activities must or cannot occur at the same time</i>)	Scheduling, synchronisation	Sequential / reciprocal	Direct supervision / standardisation of work / mutual adjustment
Task / subtask (<i>achieving overall goal requires multiple subtasks to be completed</i>)	Goal selection (<i>choosing the goal</i>), task decomposition (<i>choosing the subtasks required to complete the goal</i>)	Sequential / reciprocal	Direct supervision / standardisation / mutual adjustment
	Group decision making, for example voting or consensus reaching	Pooled / reciprocal	Direct supervision / standardisation / mutual adjustment
	Communication, the transfer of knowledge between individuals	reciprocal	Direct supervision / standardisation / mutual adjustment

Table A.4.: Synthesis of coordination mechanisms and interdependency.

Coordination mechanism (Mintzberg 1979)	examples of coordination methods		Interdependency (Thompson 1967)	Emphasis on integrating actions, transferring knowledge or shared knowledge (Grant 1996)
Standardization	Rules and directives (Grant 1996)	Resource allocation (Malone & Crowston 1994)	pooled	integrating actions
		notification, transportation or standardisation (Malone & Crowston 1994)	sequential	integrating actions
		Goal selection, task decomposition (Malone & Crowston 1994)	sequential	integrating actions
	Plans (Grant 1996; Thompson 1967)	Scheduling, synchronisation (Malone & Crowston 1994)	sequential / Reciprocal	integrating actions
Mutual adjustment	Routines* (Hutchins 1991; Grant)		sequential / Reciprocal	Integrating actions, shared knowledge
	Groups decision making (Grant 1996; Malone & Crowston 1994)		Reciprocal	transferring knowledge
	Formal and informal communication (Mintzberg 1979; Malone & Crowston 1994; Ven et al. 1976)		Reciprocal/ Team (Ven et al. 1976)	transferring knowledge
	Shared representation / Mental model (Asch 1987; Karl E. Weick & Roberts 1993)		Reciprocal	Shared knowledge

* Relatively stable patterns of behaviour created by shared norms and values.

Appendix B: Social science methodology

B.1. Social and organisational research methodology

Social science research includes several research paradigms each following distinct epistemological and ontological stances (Hatch 1997). The two most prominent research paradigms within social science research are the positivist (also referred to as modernist) social sciences, and the interpretive social sciences (Neuman 2011; Hatch 1997). The positivist, or modernist, approach to social science assumes a social realist paradigm that holds there is a universal social reality that can be objectively described through causal laws (Neuman 2011; Hatch 1997). Key characteristics of positivist social research are a hypothetico-deductive approach (Bryman 1988), a focus on external validity (generalizability) (Locke 2001) and an assumption that the researcher is neutral and objective (Neuman 2011). Data in positivist research is typically quantitative but can also be qualitative (Denzin & Lincoln 2005), for example William Foote Whyte's (1955) study of 'Cornerville'. Common positivist methods include experiments and surveys (Neuman 2011). Kimbrough and Compton's (2009) attempt to establish a probabilistic relationship between *a priori* measures of organisational culture and enterprise risk management implementation is an example of the modernism paradigm in organisation studies.

The interpretive (or constructivist) social sciences developed from criticisms of positivism's assumption of a universal social reality and challenged the ability of researchers and language to objectively observe and describe social realities (Denzin & Lincoln 2005; Cunliffe 2003). The interpretive social sciences accept that there can be multiple perceptions of reality and aim to understand social reality from the perspective of those who live it (Locke 2001). They assume that what is viewed as

reality is constructed through shared history, experience and communication (Berger & Luckmann 1967). Critically, interpretive social science places scientists within that processes of 'reality construction' and therefore do not assume researcher neutrality (Rabinow & Sullivan 1979; Latour & Woolgar 1986). Therefore, interpretive methodologies place an emphasis on reflexivity: consciously and explicitly identifying how the researcher's knowledge, assumptions and actions influence data gathering (for example, the influence the researcher may have on interviewee's responses) and data analysis (Cunliffe 2003; Nagel 1986). Typical interpretivist methodologies include ethnographic interviews and participant observation (Hatch 1997). Interpretivist research in organisational studies focuses on the subjective experience of being in organisations and how those experiences are produced (Hatch 1997; Locke 2001). Examples include Weick's enactment theory (1969) and Taylor and Van Every's (2000) discourse based view of the firm which emphasises the role of individuals and shared language in creating organisations.

Other approaches to social and organisational science include the critical social sciences (Neuman 2011) and the postmodern paradigm (Hatch 1997). The critical social sciences abandon any requirements for research neutrality and actively aim to influence the social phenomena of interest (Neuman 2011). Action research is perhaps the best known example of this (Locke 2001). The postmodern paradigm developed from literary and arts movements in the 1960s, and takes the relativist stance of interpretivist to a more extreme level (Locke 2001). Postmodernism abandons any assumption that science can be objective and value free and instead focuses on the power relations between different perspectives of reality (Parker 1992). Postmodern research typically aims to deconstruct texts to identify the values and assumption that

underpin the version of reality therein (Kincheloe & McLaren 1994). This extends to scientific texts, for example Calas and Smircich's (1991) investigation of the cultural influence on theories of leadership.

B.2. Qualitative and quantitative data

As a general rule positivist methodologies tend to use quantitative data and interpretivist methodologies use qualitative data, although this is not absolute and research can incorporate both forms of data (Neuman 2011; Yin 2008). Quantitative data takes the form of numbers, most often from research methods such as surveys and experiments but also from methods such as content analysis of interview transcripts of documents (Denscombe 2007). Analysis of quantitative data offers benefits such as compatibility with statistical testing and succinct methods of presentation such as tables and charts (Denscombe 2007). Statistical tests can also be applied to quantitative data to objectively test hypotheses and establish the confidence to which findings can be generalised to a wider population (Denscombe 2007). However, the confidence to which the analysis of quantitative data can be generalised is highly dependent on data quality: variables must be stable and well defined; objectively and consistently measured; sufficient sample size and the wider population must be defined (Denscombe 2007). Social phenomena, that change over time (such as management philosophies), are open to multiple interpretations (for example, attitudes towards gender roles) and have unclear wider populations are problematic for quantitative analysis (Tsoukas 2009).

Qualitative data is defined simply as data that is not numerical (Glaser & Anselm Strauss 1967), can take the form of words and visual images, and can accommodate

unstable variables, multiple interpretations and unclear populations (Buchanan 2012; Tsoukas 2009). Qualitative data is primarily produced through interpretivist research strategies (Hatch 1997) such as ethnography, phenomenology and grounded theory, using methods such as interviews, documents and observation (Denscombe 2007). A common principle of interpretivist, qualitative data analysis, derived from grounded theory (Glaser & Anselm Strauss 1967), is that analysis should be grounded and emergent. This means that results and conclusions, including the analytical categories forming results, are developed directly from the data collected and not defined prior to data gathering (Locke 2001). This is in contrast to the hypothetico-deductive approach typifying quantitative research where variables and their relationships, in the form of hypotheses, are developed prior to data gathering (Bryman 1988). One advantage of qualitative analysis is it that can develop an in-depth and detailed knowledge of very specific social phenomena (Tsoukas 2009). This is suited to studies of unusual or complex subjects and generates strong internal validity (Denscombe 2007; Tsoukas 2009; Malterud 2001). However, this focus on the particular is the basis of a common criticism of qualitative research: that by developing a description that is very context specific, external validity and wider generalizability is weakened (Denscombe 2007; Tsoukas 2009).

B.3. Inductive, deductive and abductive

Both qualitative and quantitative social and organisational research is often delineated by whether it follows deductive or inductive logic. Research that follows a deductive (or hypothetico-deductive) begins with a theory from which a proposition or hypothesis is developed. The proposition or hypothesis is then compared against real-world observations to test whether it is a 'true' description of reality or not (Locke 2001). In contrast research that follows an inductive approach begins with a set of

observations from which a set of related concepts are developed that explain the observation (Locke 2001).

An alternative approach, abductive logic, begins with an empirical observation like inductive logic but does not end with an explanation for the observation (Kelle 2005). Instead, the explanation or hypothesis developed must first explain the observed phenomena but must also relate to previous knowledge and experience (Kelle 2005). In this way previous knowledge facilitates the interpretation and explanation of the phenomena under study while being modified to reflect the empirical observations (Kelle 2005). In practice this involves applying prior knowledge (for example, existing theories and past empirical observations) retrospectively (*i.e.* after empirical data relating to the phenomena under study is collected and described) to make sense of empirical data and, when all other options are exhausted, modifying or recombining previous knowledge to fit the data. Alasuuter et al. (2008) describe abductive logic as the “imaginative interpretation of accounting for finds by entertaining all possible theoretical interpretations, then checking these interpretations against experience until arriving at the most plausible theoretical explanation”.

B.4. Qualitative management and organisational research practices

In addition to the various research paradigms there are several distinct practices of qualitative research used in organisational studies. The four most common research strategies are; ethnography, action research, case work and grounded theory (Locke 2001). Each of these research strategies can be applied following any the research paradigms discussed, including interpretivist and positivist approaches (Locke 2001). These research strategies share some common elements and in practice qualitative research often combines aspects of ethnographic, case study and grounded theory

methods (Locke 2001). However, there are differences between these research strategies that deserve consideration.

B.4.1. Action research

Action research was primarily developed by Kurt Lewin, who was concerned with achieving social improvement through research (Lewin 1951). The basic principle of action research is that social phenomena can be best understood by changing them and observing the results. In organisational studies action research involves learning about organisations while bringing about a change in those organisations (Baburoglu & Ravn 1992). Action research typically starts with a problem, formulates an action plan to address the problem and evaluates the outcome (Elden & Chisholm 1993). Action research can follow both a postmodern research paradigm, for example addressing issues of inequality in political discourse, or a modernist research paradigm, for example trying to identify underlying truths that can improve organisational performance (Locke 2001).

B.4.2. Ethnography

Ethnography developed from social and cultural anthropology and emphasises the collection of first-hand data on social and cultural life (Locke 2001). Ethnographic research tends to focus on one, or a very few, social settings, developing an in-depth description of social or cultural life from an insider perspective and is thus, strongly aligned with the interpretivist research paradigm (Locke 2001). In common with grounded theory the research is inductive and analytical categories are developed as the research progresses (Hammersley & Atkinson 1996). Ethnographic research is typified by extensive participant observation, for example in organisational studies the

researcher may commit one year to a particular study, taking part in the daily life of the organisation for the duration (Barley 1990).

B.4.3. Case studies

Case studies refer to research on a particular context or defined system ('the case') (Locke 2001). The research methods used vary considerably between case studies and include both positivist and interpretivist research paradigms (Yin 2008; D. Buchanan 2012). Case study based strategies are often used for descriptive, exploratory or explanatory research (Yin 2008) but can also be used to develop and test theory (D. Buchanan 2012; Tsoukas 2009). The key feature of the case study approach is that it considers the phenomenon of interest (the case) within its real life context (Yin 2008). For example, a case study on risk managers will interview or observe risk managers within their organisational context and incorporate relevant aspects of that context into the research. This is in contrast to laboratory experimentation and modelling which remove data gathering from the real life context (Meredith 1989). Yin (2008) describes case studies as suited to developing explanations of contemporary events where there is direct access to key individuals involved, for example through direct observation or interviews, but where the researcher cannot control the subjects' behaviour (Table B.1). Case studies are also considered particularly appropriate where the phenomenon studied is difficult to delineate from its context (D. Buchanan 2012) or where the wider population of which the case is a member is unclear (Tsoukas 2009).

Table B.1: Selection of methods, from Yin (2009)

Method:	Form of research question	Requires Control of Behavioural Events?	Focuses on Contemporary Events?
Experiment	How, why	Yes	Yes
Survey	Who, what, where, how many, how much	No	Yes
Archival analysis	Who why, where, how many, how much	No	Yes/no
History	How, why	No	No
Case study	How, why	No	Yes

Case studies can incorporate any data source deemed relevant to the case, including both qualitative and quantitative data from a wide range of sources (Locke 2001). Stake (1994) and Yin (2008) identify six sources of data that can be used for case studies: interviews, direct observation, participant observation, physical artefacts, archival records and documents. However the full range of data sources used in case studies is more extensive (D. Buchanan 2012). In fact, there is no consensus on how data should be gathered for case studies and practice varies considerably (Locke 2001). Some case study methods require research questions and working hypothesis to be developed before data gathering (Yin 2008), other case studies develop the research question retrospectively (D. Buchanan 2012).

Data analysis methods also vary between case studies. Yin (2008) describes five possible methods of data analysis for case studies:

1. Pattern matching: Comparing the actual outcome of a case, or cases, with a predicted outcome, for example one predicted by a theoretical model.
2. Explanation building: Generating a causal explanation or hypothesis of the observed phenomena and identifying links for further research.
3. Time-series analysis: A pattern matching analysis comparing changes over time.

4. Logic models: Comparing predicted and observed outcomes over a series of iterations, with immediate, intermediate and ultimate outcomes. This can be used as part of action research to evaluate the effect of interventions.
5. Cross-case synthesis: Comparing the outcome of multiple cases by common set of criteria.

As Buchanan (2012) points out these methods of data analysis are not rigid or exclusive, can be adapted to specific contexts and applied in combination to one set of data.

As a result of the methodological diversity of case studies, they are considered by some to be primarily a research strategy for the selection of subjects to be studied (Stake 1994: 236). Cases are selected following the principle of theoretical sampling: cases which offer the greatest opportunity to learn about the research subject (Patton 2002; Yin 2008). More specifically, cases can be selected because they are unusual (intrinsic cases); because they offer insight into the issue or theory or interest (instrumental cases), or as part of multiple instrumental case studies in order to strengthen generalizability through replication logic (collective cases or multiple cases) (Stake et al. 1994; Yin 2008).

The strength of case studies is their ability to develop strong internal validity (Malterud 2001) through in-depth description of multiple factors concerning each case. This allows for triangulation of facts, whereby multiple sources of data can corroborate results (Yin 2008). It also allows the divergences and differences between the perspective and experience of individuals within a case study to be investigated (Buchanan 2012; Buchanan & Dawson 2007). In contrast, perhaps the most contentious aspect of case studies is their external validity (generalizability). Case studies face criticism because of their small sample sizes, with studies often

concerning a single case (Buchanan 2012; Buchanan 1999). However, this criticism is flawed as a case does not equate to a single iteration of a single variable but incorporate multiple factors together with contextual knowledge (Buchanan 2012). Following this, Yin (2008) argues that analysis based on multiple case studies is more akin to repeating experiments (replication logic) than multiple, individual data points. Furthermore, because the wider relevance of case study results is not measured according to sample logic, sample size is not a critical factor (Yin 2008). Buchanan (2012) argues that case study results can be generalized through four approaches that are independent of sample size:

1. *Moderatum generalizations*: Generalizing (Payne 2005) based on common features between the case studies and other cases. For example if an ‘incident command system’ led to coordinated behaviour in the case study organisation (Bigley & Roberts 2001), other organisations with similar incident command systems can be inferred to have similar coordination characteristics.
2. *Naturalistic generalisations*: Where the reader of a case study applies the knowledge gained from the case study to his or her own situation (Stake et al. 1994).
3. *Analytical refinement*: Case study results are generalized to theory (also called analytical generalization). Here a case study of a phenomena generates results that add to, or modify an existing theory concerning that phenomena, thus expanding the body of knowledge available (Tsoukas 2009). For example the development of high reliability theory (Weick et al. 1999) through multiple successive case studies.

4. Isomorphic learning: Transferring the knowledge learned from one case to others that share a common feature. This is primarily applies to transferring the lessons learned from accidents and disasters to other settings, for example other organisations in the same sector, or other organisations in different sectors that use similar processes (Toft & Reynolds 2005 pp66 and 72-5).

B.4.4. Grounded theory

Grounded theory was first developed by Barney Glaser and Anselm Strauss in the early 1960s. Their book 'The Discovery of Grounded Theory' published in 1967 marked a major shifting point in qualitative research towards more inductive approaches and has become the basis of qualitative research today (Locke 2001; Glaser & Anselm Strauss 1967; Alasuutar et al. 2008). Grounded theory is a strategy for qualitative research that overlaps with action research, ethnography and case study research (Locke 2001). For example, it can aim to inform practitioners like action research, it uses theoretical sampling like case studies and inductively develops analytical categories throughout the research processes like ethnography (Locke 2001). In fact grounded theory is often used in conjunction with a case study sampling strategy to gather data (Locke 2001). However, grounded theory differs from ethnography in that it is less focussed on culture and it differs from case studies in that it has a codified and systematic process of qualitative data analysis (Locke 2001). Grounded theory was developed partly in response to perceived shortcoming in social research methods of the 1950s and 60s. Theory in sociology at the time was predominantly formed from the results of quantitative methods following a positivist paradigm (Alasuutar et al. 2008). Barney Glaser and Anselm Strauss felt that the influence of established theory on the outcomes of the positivist, hypothetico-

deductive methods used were resulting in a growing gap between social theories and reality. At the same time they perceived that qualitative research often followed unclear methods and was primarily description and therefore, not developed into theory. In response to this, they developed grounded theory, of which the key contribution was to establish a more explicit and systematic methodology for the inductive development of theory from qualitative observation of social phenomena (Alasuutar et al. 2008).

The core principles of grounded theory are inductive logic; simultaneous data collection and analysis; and constant comparison of the emergent findings against empirical observations (Alasuutar et al. 2008). The original grounded theory method sets out a systematic process of coding that develops analytical categories (codes), refines those codes and checks them against the empirical data as the codes become increasingly theoretical (Glaser & Straus 1967; Alasuutar et al. 2008). The basic steps of coding in grounded theory (Glaser & Straus 1967; Strauss & Corbin 1990; Bazeley 2007) are as follows:

1. Descriptive coding: Also called 'open coding' here analytical categories, or codes, closely describing the data are developed by asking questions of the data, such as who are the actors involved, what are their actions, what is the context of their action. The various characteristic of the data are separately coded (fracturing the data).
2. Selecting focused codes: The most frequent or interesting codes are selected for further analysis and expanded by further data gathering following the principles of theoretical sampling.

3. Organising focused codes: Here the focused codes are compared to each other and organised into categories based on similar qualities, for example all codes describing actions or motivations could be grouped together.
4. Axial coding: These describe relationships between the descriptive codes. These are identified by recombining the fractured open codes to identify patterns or associations between codes.
5. Theoretical coding: These are abstract concepts which make sense of the overall data by linking the focused and axial codes with each other, and possibly with existing theoretical concepts.

In addition, throughout the coding process the researcher is constantly comparing codes and data to 'ground' the emerging codes in data (Glaser & Strauss 1967; Strauss & Corbin 1990; Bazeley 2007). The comparisons include:

1. Comparing data with data: Data is compared with data to identify commonalities between the data that could be coded.
2. Comparing data with descriptive codes: The data within each code is compared to the description of the code to make sure the code is a reasonable representation of the data.
3. Comparing data with abstract codes (axial and theoretical): The abstract codes developed are compared to the original phenomena described (recontextualised) to determine if they are reasonable.
4. Comparing abstract codes with concepts: The abstract codes developed through grounded theory can be compared to the concepts of other theories to determine how the emergent findings relate to prior knowledge.

This said, precisely what grounded theory is and how it should be implemented is by no means unanimously established and a variety of interpretations and applications exist (Locke 2001). Early grounded theory methodology (Glaser & Strauss 1967; Strauss & Corbin 1990) contained both positivist and interpretivist elements (Locke 2001). For example the emphasis on ‘discovering’ facts, a single core variable and researcher neutrality reflect positivist assumptions, while the emphasis on the subjective perspective of the social actors studied reflects interpretivist assumptions (Locke 2001; Alasuutar et al. 2008). The positivist elements of grounded theory have subsequently been challenged (Kelle 2005; Charmaz 2006). In particular, the original grounded theory (Glaser & Strauss 1967) is seen to contain a conflict between its concepts of ‘emergence’ and ‘theoretical sensitivity’, which on the one hand insist on a purely inductive process, rejecting the role of prior knowledge in the emergence of facts, while on the other hand accept that a degree of prior knowledge is required to recognise relevant data and make sense of it (Kelle 2005). Strauss and Corbin (1990) attempted to overcome the conflict between the desire for a purely emergent methodology and the necessity of theoretical sensitivity with a collection of generic concepts that can be used to objectively identify relationships between descriptive codes. These are: (1.) phenomena at which the action and interaction in the domain under study are directed, (2.) causal conditions which lead to the occurrence of these phenomena, (3.) attributes of the context of the investigated phenomena, (4.) additional intervening conditions by which the investigated phenomena are influenced, (5.) action and interactional strategies the actors use to handle the phenomena and (6.) the consequences of their actions and interactions (Anselm Strauss & Corbin 1990). However, as Kelle (2005) points out the coding paradigm is not theoretically neutral as it reflects a micro-sociological perspective emphasising the

role of individuals in creating social phenomena and is therefore not compatible with research into macro-sociology or system theory. Kelle (2005) argues that abductive rather than purely inductive logic best describes the process of grounded theory: rather than developing theory based solely on data derived from the observed phenomena, theory is developed by integrating the observation of the phenomena with prior experience and knowledge. Adoption of abductive logic and rejection of the assumption of researcher neutrality lead to the development of more strongly interpretivist (constructivist) iterations of grounded theory (Charmaz 2006). Constructivist, grounded theory recognises the role of the researcher and their prior knowledge in constructing the emergent results, for example through sample selection, data collection and interpretation of the data (Alasuutar et al. 2008). Following an interpretivist research paradigm, constructivist grounded theory emphasises the need to accounting for multiple perceptions of experience in social phenomena and the importance of accounting for researcher reflexivity (Charmaz 2006; Cunliffe 2003).

References

- Alasuutar, P., Bickman, L. & Brannen, J., 2008. The Sage Handbook of Social Research Methods. In London: SAGE.
- Baburoglu, O.N. & Ravn, I., 1992. Normative Action Research. *Organization Studies*, 13(1), pp.019–34.
- Barley, S.R., 1990. Images of Imaging: Notes on Doing Longitudinal Field Work. *Organization Science*, 1(3), pp.220–247.
- Bazeley, P., 2007. *Qualitative data analysis with NVivo*, Los Angeles ;London: SAGE.
- Berger, P.L. & Luckmann, T., 1967. *The social construction of reality : a treatise in the sociology of knowledge*, Garden City, N.Y.: Doubleday.

- Bigley, G.A. & Roberts, K.H., 2001. The incident command system: high-reliability organizing for complex and volatile task environments. *Academy of Management Journal*, 44(6), pp.1281–1299.
- Bryman, A., 1988. *Quantity and quality in social research*, London; Boston: Unwin Hyman.
- Buchanan, D., 2012. Case studies in organizational research. In C. Cassell & G. Symon, eds. *Qualitative organizational research : core methods and current challenges*. London: SAGE.
- Buchanan, D. & Dawson, P., 2007. Discourse and Audience: Organizational Change as Multi-Story Process. *Journal of Management Studies*, 44(5), pp.669–686.
- Buchanan, D.A., 1999. The Logic of Political Action: an Experiment with the Epistemology of the Particular. *British Journal of Management*, 10(s1), pp.73–88.
- Calas, M.B. & Smircich, L., 1991. Voicing Seduction to Silence Leadership. *Organization Studies*, 12(4), pp.567–601.
- Charmaz, K., 2006. *Constructing Grounded Theory*, London: SAGE.
- Cunliffe, A.L., 2003. Reflexive Inquiry in Organizational Research: Questions and Possibilities. *Human Relations*, 56(8), pp.983–1003.
- Denscombe, M., 2007. *The good research guide for small-scale social research projects*, Maidenhead: Open University Press. Available at: <http://public.eblib.com/EBLPublic/PublicView.do?ptiID=316269> [Accessed March 15, 2012].
- Denzin, N.K. & Lincoln, Y.S., 2005. *The SAGE handbook of qualitative research*, Thousand Oaks: Sage Publications.
- Elden, M. & Chisholm, R.F., 1993. Emerging Varieties of Action Research: Introduction to the Special Issue. *Human Relations*, 46(2), pp.121–142.
- Glaser, B. & Strauss, A., 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*, New York: Aldine de Gruyter.
- Hammersley, M. & Atkinson, P., 1996. *Ethnography : principles and practice*, London: Routledge.
- Hatch, M.J., 1997. *Organization Theory: Modern, Symbolic and Postmodern Perspectives*, Oxford: Oxford University Press.
- Kelle, U., 2005. “Emergence” vs. “Forcing” of Empirical Data? A Crucial Problem of “Grounded Theory” Reconsidered. *Forum: Qualitative Social Research Sozialforschung*, 6(2), p.Art. 27.

- Kimbrough, R.L. & Componation, P.J., 2009. The Relationship Between Organizational Culture and Enterprise Risk Management. *Engineering Management Journal*, 21(2).
- Kincheloe, M. & McLaren, P., 1994. Rethinking critical theory and qualitative research. In N. K. Denzin & Y. S. Lincoln, eds. *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage, pp. 138–157.
- Latour, B. & Woolgar, S., 1986. *Laboratory life : the construction of scientific facts*, Princeton, N.J.: Princeton University Press.
- Lewin, K., 1951. *Field Theory in Social Science*, New York: Harper & Row.
- Locke, K., 2001. *Grounded theory in management research*, London; Thousand Oaks, Calif.: Sage Publications.
- Malterud, K., 2001. Qualitative research: standards, challenges, and guidelines. *The Lancet*, 358(9280), pp.483–488.
- Meredith, J., 1989. Alternative research paradigms in operations. *Journal of Operations Management*, 8(4), pp.297–326.
- Nagel, T., 1986. *The view from nowhere*, New York: Oxford University Press.
- Neuman, W.L., 2011. *Social research methods : qualitative and quantitative approaches*, Boston: Pearson.
- Parker, M., 1992. Post-Modern Organizations or Postmodern Organization Theory? *Organization Studies*, 13(1), pp.001–17.
- Patton, M.Q., 2002. *Qualitative Research & Evaluation Methods*,
- Payne, G., 2005. Generalization in Qualitative Research. *Sociology*, 39(2), pp.295–314.
- Rabinow, P. & Sullivan, W., 1979. The interpretive turn: a second look. In P. Rabinow & Sullivan, eds. *Interpretive Social Science: A Second Look*. Berkley CA: University of California Press, pp. 1–30.
- Stake, R.E., Denzin, N.K. & Lincoln, Y.S., 1994. Case studies. In *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage, pp. 236–247.
- Strauss, A. & Corbin, J., 1990. *Basics of Qualitative Research. Grounded Theory Procedures and Technique*, Newbury Park, CA: SAGE.
- Taylor, J.R. & Van Every, E.J., 2000. *The emergent organization communication as its site and surface*, Mahwah, N.J.: Lawrence Erlbaum Associates. Available at:
<http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=24284> [Accessed February 14, 2012].

- Toft, B. & Reynolds, S., 2005. *Learning from disasters : a management approach*, Leicester [England]: Perpetuity Press.
- Tsoukas, H., 2009. Craving for Generality and Small-N Studies: A Wittgensteinian Approach towards the Epistemology of the Particular in Organization and Management Studies. In D. Buchanan & A Bryman, eds. *The SAGE Handbook of Organizational Research Methods*. London: Sage, pp. 285–301.
- Weick, K E, Sutcliffe, K.M. & Obstfeld, D., 1999. Organizing for High Reliability: Processes of Collective Mindfulness. In *Research in Organizational Behavior*. Stanford: Jai Press, pp. 81–123.
- Weick, Karl E, 1969. *The social psychology of organizing*, Reading Mass; Menlo Park Calif. [etc.]: Addison-Wesley Publ. Comp.
- Whyte, W.F., 1955. *Street corner society : the social structure of an Italian slum*, Chicago: University of Chicago Press.
- Yin, R.K., 2008. *Case Study Research: Design and Methods*, London: SAGE.

Appendix C: Interview questions

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Interview questions for case study one: First tranche of interviews

Intro by the interviewer

- The interview will take approximately 40min. With the help of this and other interviews we will try to gain some understanding of the risk culture in [case study one]. As you will eventually notice my questions will get more specific in the course of the interview.

- [...]

Warm-up questions

- 1 How would you describe your company in one or two phrases?
- 2 Where do you see [case study one] in 10 years?
- 3 What role can risk governance take in this development?
- 4 Can you please describe your role in the risk governance process?

Risk Culture

- 5 How was/is risk governance introduced to your department of the company?
- 6 In implementing the framework, are you introducing new methods, e.g. auditing, introduced to your department?
- 7 How much support did you get from senior management?
- 8 How do you communicate risks to the other parts of the company?
- 9 What problems have you been experiencing in these communication processes?
- 10 How do you draw the boundaries to other teams/departments' risk efforts?
- 11 And in turn how do you establish common ground?
- 12 Does your department seek external advice for establishing the risk governance framework?
- 13 How well would you say the department is in control of the risks it takes?

- 14 What is securing the continuous update of relevant risk information?
- 15 Are risks always clear to subordinates?
- 16 Do subordinates understand how risks relate to E.ON's core business?

Risk Processes

- 17 What triggers risk analysis efforts of your department?
- 18 How does your department identify risks?
- 19 How are you ranking the different risks – how does the process look like or who is involved at what stage?
- 20 How do you assess whether a risk is acceptable or not?
- 21 Are you already in a position to compare risks in your department with that of other departments?
- 22 Is your method or are your tools available to other departments?
- 23 How do you manage the knowledge you gather?
- 24 Do you already share it with other departments?

Interview questions for case study one: Second tranche of interviews

Interview questions:

General opening questions

1) In your role what sort of decisions do you make around risk?

- How often do you have to make these decisions?

2) How do you make these decisions on risk?

- What sort of thing do you draw on to help you make these decisions?
- Why would you base your decisions on X (and not Y)? (Seeking a response that would indicate whether the embeddness of values or rules affects their influence on decision making)?

3) What sort of risk management decisions do you expect your work colleges to make?

- And what do you expect them to base their decisions on?
- Why would you expect them to base their decisions on X (and not Y)? (Seeking a response that would indicate whether the embeddness of values or rules affects their influence on decision making)?

4) What do the people you work with expect you to base risk management decisions on?

- Why would they expect you to base your decisions on X (and not Y)?
(Seeking a response that would indicate whether the embeddness of values or rules affects their influence on decision making)?

5) When would you involve others in your decision making around risk?

- (If so) In these situations why would you involve others in your decision making on risk?
- And when would you not involve others in your decision making on risk, and why?

6) Have you ever made a decision that in hindsight was the wrong decision?

- What did you base this decision on?
- What were the consequences?
- In your opinion were the consequences related to what you based the decision on?

Specific questions on judgement

- 1) How does your own judgement play into decisions involving risk or risk management?
 - What sort of thing would you base your judgement on? (If needed prompt with examples: previous experience, experience of colleagues, evidence, and intuition).

- Why would you base your judgement on X (and not Y)? (*Seeking a response that would indicate whether the embeddness of values or rules affects their influence on decision making*).
 - Could you give me examples of risk management decisions you would mainly rely on your own judgement for?
- 2) And conversely when would you not primarily rely on your own judgement for a decision?
- How would you make decisions in this situation? (If needed prompt with example: rules, procedures, standard solutions).
 - Why would you base your decision on X (and not Y)? (*Seeking a response that would indicate whether the embeddness of values or rules affects their influence on decision making*).
 - Could you give me examples of risks you would not primarily rely on your own judgement in managing?
- 3) Under which conditions would you involve a more senior employee in your decision making?
- What sort of thing would you use to make a decision in this situation?
 - Why would you base your decision on X (and not Y)? (*Seeking a response that would indicate whether the embeddness of values or rules affects their influence on decision making*).
 - Please give me examples of risks you would involve a more senior employee to manage?
 - Why would you defer to seniority in these situations?

- 4) And when would you not involve a more senior employee?
- In these situations what would you use to make your decisions?
 - Why would you base your decision on X (and not Y)? (*Seeking a response that would indicate whether the embeddness of values or rules affects their influence on decision making*).
 - Please give me examples of risks you would not involve a more senior employee?
 - Why would you not defer to seniority in these situations?
- 5) Under which conditions would you follow your own judgement even if that meant breaking or bending a rule or procedure?
- What sort of thing would you base your judgement on in this situation?
 - Why would you base your judgement on X (and not Y)? (*Seeking a response that would indicate whether the embeddness of values or rules affects their influence on decision making*).
 - Please give me examples of risks you would break or bend a rule when managing, if you thought that was the right thing to do?
 - What consequences might you expect if your decision was A) the right one and B) the wrong one?
- 6) And when would you not break or bend a rule even if it was against your better judgement?
- What sort of thing would you base your decision on in this situation?

- Why would you base your decision on X (and not Y)? (*Seeking a response that would indicate whether the embeddness of values or rules affects their influence on decision making*).
 - Please give me examples of risks you would not break or bend rules when managing even if you thought it would be the right thing to do?
 - What consequences might you expect if your decision was wrong?
- 7) When would you, and when would you not rely on someone else's judgement in making a risk management decision?
- 8) If you had only a limited amount of time to make a decision, say 1 hour, would this influence how much you relied on your own judgement or not?
- What if you only had a very little time, say 15 minutes?
 - What if you had lots of time, say several months?
- 9) Would the potential severity of the consequences of a decision influence whether you used your own judgement or not?
- Would the basis on which you made the decision affect the reaction from the organisation?
- 10) Would whether you had experience of a risk on which you are making a decision, affect whether you used your own judgement or not?
- What if a colleague had experience of the risk?

- If the risk was totally new to the organisation, would this affect how you would make a decision about it?
- If the risk was well known and had been experienced many times, would this affect how you would make a decision about it?

11) <The organisation> operates across a wide geographical area in lots of different situations from urban to rural to industrial, does this influence whether you use judgement or not in managing risk, or rely on other peoples' judgement?

Second case study interview questions

Introduction (to give interviewee)

Hello, first thank you for taking the time to meet with me, it is much appreciated.

Second, everything in this interview will be held in confidence and any use of the data will be made anonymous. Before any results are published based on anything from this interview I will send a copy to you for your approval. At that stage, or any stage until actual publication, you are free to have your data removed and deleted. This research is being carried out by Cranfield University on behalf of DEFRA. It aims to investigate current risk management practices, the consistency in those practices, and the factors shaping them. We hope this will provide understanding on why some risk management practices become widespread and some do not.

Bullet points signify secondary questions that can be asked if content is not addressed by main (numbered) question.

Opening question:

- 1) Are you familiar with the concept of risk-based policy making?
 - Would you say you are using such an approach?

Perception of risk based policy-makings:

2) What is the purpose of risk based policy-making?

3) Who or what is the main beneficiary of risk based policy-making and what benefit do you derive from it?

Risk management in the policy cycle:

4) How do your risk management activities change as you move through the policy cycle?

- Has this been the same for other policy domains you have worked in?
- What informs what risk management you engage in and when (throughout the policy cycle)?

5) To what extent is there a common understanding within DEFRA on how to handle risk in the policy cycle?

- What is the basis for this common understanding, for example shared experience of what works and what doesn't, or codified guidance?

6) Can you give me a broad outline of the types of risk that you incorporate into your risk management, for example social, environmental, and economic?

- Why do you manage risk according to these categories?

7) How do you differentiate between managing risk to DEFRA as an organisation (for example delivery risks such as damage to DEFRA's reputation) and managing the

external risks DEFRA is responsible for (for example policy risks, such as the economic impact of animal disease)?

8) Which points in the policy cycle are most problematic in terms of risk management?

- How do you manage the transition from directly managing risk to managing risk through a delivery partner?

General risk management, governance and areas of difficulty:

What is risk and to whom?

9) What are the main receptors, for example, for the risk assessment of a landfill site receptors may include local residents and ground water, or stakeholders is risk impact considered in relation to?

- How do you engage with stakeholders on issues of risk?

Rules versus expertise and experience

10) How much discretion do you have to how you manage risk?

- In circumstances not covered by best practice guidelines what guides your risk management?

11) To what extent does risk enter into everyday discussion during policy development, or is risk mainly discussed within defined risk management activities?

12) Is it necessary to employ different risk assessment methods for different types of risk?

- When would you employ quantitative data gathering, expert judgement or in team experience?
- What informs the choice of risk assessment method employed?

Hindering factors

13) What, if any, factors limit your ability to manage risk?

- What changes would you like to see that would facilitate your ability to manage risk?

Coordination between subgroups and stakeholders

14) To what extent is there a common perception of risk within DEFRA?

15) When managing reputational risk, whose reputation do you consider, for example, ministerial reputation, your policy team, or the delivery partner?

16) In the context of risk management, how do you handle conflicting interests between DEFRA and delivery partners?

- What is the view of senior management within DEFRA on such issues?

17) How do you manage for the possibility your actions may impact on the risks faced by another policy domain, for example, by alienating a mutual stakeholder, or perverse regulatory impacts on other policy domains?

Potential areas of difficulty where cultural factors may guide behaviour

18) How do you keep up to date on current issues, escalating risks and emerging concerns?

19) How do you assess whether a risk is acceptable or not and how clear is the guidance on this?

- What is the underlying rationale for this basis upon which to assess risk acceptability?

Final question, risk based policy-making impact:

20) How has risk based policy-making changed how DEFRA creates and implements policy? Have all these changes been beneficial?

Additional questions (if there is time):

21) How do you deal with high impact low probability risks versus low impact high probability risks?

22) How do you determine whether quantitative or qualitative risk assessment is more appropriate and how to you incorporate quantitative and qualitative data into overall risk based decisions?

23) How do you manage risks generated internally by DEFRA or your policy team (for example institutional blindness) as opposed to risks originating externally (such as flooding)?

24) How do you address comparison or trade-offs between very different risk categories, for examples social risk and economic risks? How clear is the guidance on this?

25) Where does the largest uncertainty reside in your risk management activities?

- How do you communicate uncertainty in your risk assessments?
- How do you minimise or reduced uncertainty to an acceptable level?
- Is there a clear understanding of how to deal with uncertainty in risk management within DEFRA?

Appendix G: Example of full codes

Data making up the code 'Informal risk management' (case study two):

<Interviewee\CD_vn680039_wma_transcript_4N> - § 4 references coded [4.58% Coverage]

Reference 1 - 0.62% Coverage

I worked previously in a much more reactive environment on international trade. It was much less programme and project managed. As a result I think risk was less systematically approached there.

Reference 2 - 1.38% Coverage

Yes well, in terms of risk in this job I haven't seen any sort of formal Defra risk guidance that outlines how to assess risk and deal with risk. What I do in my team is discuss it with my wider team and with my managers, and there was actually something from Cranfield University actually on risk which was circulated and which I looked at. And that would be the closest thing to a sort of formalised approach to risk that I've seen.

Reference 3 - 2.24% Coverage

No, no. There was... again, I think in the previous role risks did tend to crop up and were then dealt with. There wasn't that much forward planning. Possibly that was a function of the role, it wasn't a typical Defra role. It wasn't really to do Defra, to do with UK government policy, it was essentially responding to other government's policies because it was an international trade function. And it was to do with if other governments change their policies or if there's an animal disease outbreak or something, you have to react to that. So in terms of a general approach to those risks, I think there was a fair amount of planning done, but on a more specific level, perhaps it's not that easy to do.

Reference 4 - 0.35% Coverage

Interviewer: And was it the same in the previous role you had? Was there...

Respondent: Again, not really no.

<Interviewee\\DW_vn680043_wma_transcript_m8> - § 7 references coded [7.07% Coverage]

Reference 1 - 0.49% Coverage

Yes, in the formal sense yes. I think with the stuff we've been doing, you know the day to day business we've been doing for years and probably you don't think that much in terms of formal risk management. Maybe you do it kind of instinctively,

Reference 2 - 1.17% Coverage

we had a situation where regional offices had closed and we've had to move the work, and you know you had to do it really quickly and almost by the seat of your pants really in a way. And, in those circumstances you might, might not actually sit down and do a formal risk management, or I guess you should do because it is a project in a sense but, so I think what I'm saying is that, where you're setting out on a formal project and you probably would think about risk management but are probably areas where you don't because there aren't set processes that you're supposed to go through.

Reference 3 - 0.40% Coverage

Sometimes when things come out of the blue and they're below the radar then you might do that without a risk management. And you're probably thinking about risk but you're not doing in a formalised way.

Reference 4 - 2.27% Coverage

Interviewer: So in that sort of grey area where there's no, it's not clear that there's a formal process, that's required and appropriate for that, you know in the grey area, to what extent is there a sort of a common understanding on how to manage risk by Defra, or how much consistency is there?

Respondent: I think you know it's interesting talking about it, I think it's possibly there isn't that much of an understanding about these things need to be dealt with and maybe that's an area that needs further thinking really. But it comes, I think these sort of things become embedded don't they? As I say it's a fairly relatively new way of looking at things. And I guess it's not got to the point yet where it's instinctive. It's that sort of, what do they call it, conscious competence and unconscious competence. We haven't got yet to the point where you do it just instinctively.

Yes, you probably do it informally, instinctively, but you don't do a formal process. I don't think we've got to that point yet where you would instinctively think "Oh yes I've got a problem, what I ought to do is sit down and do a risk assessment."

Reference 5 - 0.84% Coverage

With the smaller ones, where you don't need external approval, you might be able to choose I guess, whether you do a risk register or not. But it would make sense, if it's a new project to do it. And I guess then there's those smaller things that we talked about earlier, where they're almost part of the day to day job, which you could do a risk register, but you might think "Well actually that's a bit over the top." So...

Reference 6 - 1.04% Coverage

Well I think again it's – I think it probably would, it depends again on whether that particular piece of work is significant enough for you to think that it justifies having a risk register. I think those earlier conversations, if it wasn't that sort of piece of work, yes they would feed in. But you know, on small pieces of work one talks about risk doesn't one. And you sort of think "There's a

risk this might happen, or there's a risk that that might happen."

But those are things which we will fall below the threshold.

Reference 7 - 0.87% Coverage

I think they're largely informal. You know I think it has to be based on your knowledge of how the organisation works. I think Defra's pretty good at sharing policy or sharing understanding or knowledge between the different policy areas. But as far as I know there's not a formal process for doing that. And of course there's always pressure, you know not to copy too many people in on e-mails, because that can be a problem in itself.

<Interviewee\\EA_vn680034_transcript_VF> - § 10 references coded [11.70% Coverage]

Reference 1 - 0.29% Coverage

Yes sort of. I can't say it's at the forefront of my mind very often. I've been taught about it but...

Reference 2 - 1.01% Coverage

Individually on my projects when they were first set up I put some risks together in the kind of project plan. The programme itself is managed, because the Food Policy Unit's run as a kind of programme with lots of projects, has risks.. a risk kind of tool that in theory's there and we can put into but I just don't particularly pay much attention to it.

Reference 3 - 0.36% Coverage

Yes I don't really get back to it. And actually for the skills work I don't think we've really done any risk analysis recently.

Reference 4 - 1.56% Coverage

I am particularly when I do with work external stakeholders I have to say. A lot of the work we do in food policy we say Government doesn't own it, it's not a Government's, it's facilitating an industry led things. And so you kind of have to think about the risks, are they going to take it on? Are they going to see this through, what you

actually want? So in that way yes but I wouldn't probably describe it as risk.

I probably would if I was being interviewed for a job. Just generally day to day I wouldn't but you do have to think about it.

Reference 5 - 1.44% Coverage

No I think probably if you, if you have somebody coming in who you might think actually particularly the Country of Origin Labelling right you probably should have more awareness of risk and you're doing more risk management. It was a government commitment in the structural reform plans we're having. It was, the first stage was delivered on time thankfully, so actually probably should've spent more time at the beginning thinking about what might have stopped it but just didn't really, I don't know why.

Reference 6 - 1.79% Coverage

Depends how much you actually check I suppose you know through the policy cycle, whether you just plough on and get on with it. And once you've taken a course of action I think quite often you tend to just drive forward and then once you've doing it you've forgotten the risks a little bit. If you do that thinking right at the beginning. I don't, I mean looking at the policy cycle here you can see that they've got risk stuff coming in all over the place. So I think it's developing appraising options is probably the main area that is looked at and once you've done that and you've picked your course you don't tend to go back.

Reference 7 - 2.20% Coverage

It actually probably does that a bit more if you actually sat up and thought about the conversation you'd had about policy development. And particularly in my work around stakeholders and getting them to agree things. It probably is, there is probably quite a lot of talk in that about risks even though it's not kind of referred to

in that way or formalised in that way. Then we're talking about you know how we're going to handle particular meetings or get particular documents cleared through stakeholder groups.

There is a kind of well what's going to happen if they don't like X, Y and Z and if this group wants that and that group wants that, what we can do about it.

So I suppose that's risk based discussion it's just in the conversation without being formalised.

Reference 8 - 0.67% Coverage

Interviewer: Is there sort of clear understanding on how you should be doing that within Defra or is that you've learnt that based on experience of doing it before?

Respondent: Experience really. It's not something that we're taught.

Reference 9 - 1.09% Coverage

It's quite hard really I think that there's a lot, there's probably there are formal ways you know the high, medium and low impact and all that kind of thing. But I don't think it is that necessarily it's more through to discussion with people that you work with about actually if this goes wrong what are we going to do about it? So it tends to be through kind of informal discussion.

Reference 10 - 1.28% Coverage

Yes. Yes and that you have, are you prepared to go, how far are you prepared to push it? You'll discuss that with people around you to get a feel for... And sometimes that's legal risks actually so you do talk to the legal team particularly on the stuff on I do on origin labelling for example. And there's all kinds of legal potholes about what you can and can't do with the context of the EU. So you'll often to talk to specialists in that to see.

<Interviewee\IB vn680036 transcript kQ> - § 3 references coded [1.82% Coverage]

Reference 1 - 0.95% Coverage

In terms of, I mean, the way I've found that most helpful is, when you've identified a risk, and you're looking at developing counter measures, where people have been doing similar things and you can go and say, you know, "How did you deal with the presentational risks on this," or, "What do you do to get round this issue?" then, yes, that's helpful. But there's...

Reference 2 - 0.72% Coverage

Yes, it's, you know, having the right network of contacts, knowing who the people are to talk to throughout the department. There's no, kind of, as far as I'm aware, sharing of risk experience that goes on other than...

Interviewer: In a formal way, it's informal?

Ian: Yes.

Reference 3 - 0.15% Coverage

And, of course, on-going discussions with people, you know.

<Interviewee\JM vn680041 transcript r0> - § 3 references coded [4.21% Coverage]

Reference 1 - 0.99% Coverage

Yes I think within my policy role it's something that we do automatically. We don't always necessarily think of it as being risk based but you know there is some, a degree of accountability and reporting etc through the, from top level down and up again so.

Reference 2 - 1.14% Coverage

And even so far as the submission to a degree, to a lesser degree it's there so that you're aware of... Although I'm not very good at telling you what the risk, the actual risks are because as I say it's kind of like you know you read up on it when you need it but we're doing it to a degree anyway.

Reference 3 - 2.08% Coverage

From experience perhaps if you've had a meeting and from that, with external stakeholders for instance and you have written up the notes of that meeting and you've sent them out for clearance and then there is disagreement as to what was understood from that meeting, that kind of is like a risk assessment isn't it. It focuses you on what you have to be careful what you're saying. You have to be clear and confident that what you're trying to get across has actually got across in the way that you want it to. So there's that aspect.

<Interviewee\\JR_vn680038_Transcript_Ln> - § 3 references coded [3.01% Coverage]

Reference 1 - 0.97% Coverage

There are always influences. You tend to work as teams to facilitate good practice and where people have had good experiences, that tends to get round. Similarly, if you – it gets round even quicker if somebody has a bad experience. So, yes, there are means of capturing and the, sort of, sharing of information across teams in terms of what's being done, and approaches.

Reference 2 - 2.03% Coverage

An informal basis, tends to be, one doesn't have time these days to do too much writing up about what a – precisely in sharing that about, it might get stored within a particular team and, I suppose, these days, I haven't actually experienced it myself, technically one could, because a lot of stuff gets shared in shared facilities now within our computer systems so, technically, team sites are there and other teams can have access, so if they want to look at what you've done for a risk register for instance, or how you've dealt with a particular stakeholder in terms of that risk, technically, those documents could be there and they could access them, so they can go to that without actually having to

come to you and say that's in here because those documents have been done.

Reference 3 - 0.01% Coverage

Yes.

<Interviewee\MB_vn680035_Transcript_PX> - § 6 references coded [7.24% Coverage]

Reference 1 - 0.59% Coverage

And sometimes it probably will but often that will be through a narrative paper or something. So someone will come to the board and say "Here's what's going on. Here are the options we're looking at. What do you think?" Rather than through a more formalised risk based approach. So I think that's probably true actually, yes.

Reference 2 - 1.83% Coverage

I think there's very little, if anything at all in the way of formal quality assurance for somebody's risk assessment. It doesn't mean that there isn't any QA. But it tends to come more from, in my experience someone will take a risk register to a program board. And the senior people who sit on that board, who do come from a variety of different policy areas and sometimes a variety of different organisations if it's a cross organisational board will give their comments. Examine it, go through it.

But to some extent it's sort of up to the SRO to satisfy himself or herself that that's been done thoroughly enough. And ultimately the buck stops with them basically. But there isn't really an obvious, automatic process for which there is guidance etc of which I'm aware for you to check... There isn't a clear view for example.

So when economists do impact assessments they have to be peer reviewed by other economists, often from other

departments. I don't know of any similarly process for risk assessments.

Reference 3 - 0.67% Coverage

I think quite often they sort of happen, a document gets circulated, everyone reads it and nods sagely. And then the document subsides again and submerges again and what's come out of it? So it's more of a sort of cultural memory and history thing that embeds those lessons. Rather than a more formalised process to make sure you're extracting maximum benefit out of it.

Reference 4 - 1.34% Coverage

Yes so that does happen and that's one of the mechanisms by which you get the kind of informal spread of people learning from the past and that kind of thing. Although there's been, it's too early for there to have been any formal exercise I have already had chats with people and had rumours circulated about what the lessons learned are from the forestry thing. Like doing proper stakeholder mapping and making sure your stakeholder mapping goes wide enough.

Someone was joking that they had a stakeholder map which had on it the Confederation of Forest Industries and the Woodland Trust and things. But nobody had put the Archbishop of Canterbury or Dame Judy Dench on their stakeholder map so... Yes those kinds of stories are circulating yes.

Reference 5 - 0.90% Coverage

I don't think there's a formalised common approach that I know of. So there isn't sort of training or a document or what have you. But I think probably a fairly common approach has actually evolved. Just through people talking to each other and using tricks of the trade and knowing the best way to do it.

It's really a generalised influencing problem. And influencing skills are something that central government officials tend to be quite good at. Because it's sort of their bread and butter.

Reference 6 - 1.92% Coverage

But where you get the information for that from is actually quite informal. Some of it's sort of fairly obvious. The kind of risks that are in the categories we talked about earlier, sort of generating internally within DEFRA or internally within government. So Treasury are about to pull the plug. Well that's a risk that everyone's probably quite aware of.

I think the risks that are probably under scrutinised and don't always get spotted. And don't always get [fed 0:43:58] assessments are more external ones like what are the fertiliser prices doing. Or like how will this policy be impacted if there's a revolution in Libya you know?

I think that kind of thing, people like me who are interested in the policy area and work in policy area will read the news. And keep up to date and have informal networks as well of people within government and outside government.

But that information gathering is perhaps sometimes a bit haphazard. And can rely on the quality of the individual's networking skills and how much attention they pay to new sources etc.

<Interviewee\\MM> - § 2 references coded [1.07% Coverage]

Reference 1 - 0.29% Coverage

you just have working groups and you just set up meetings with industry, people and things like that. It depends really.

Reference 2 - 0.77% Coverage

You have to be aware. It depends. I like to talk anyway so I will go and have a chat with people, “How did this go?”, “What happened at that meeting?”. Sometimes you can find things out that way. Other times you just land in it. Sometimes I think it is good to talk to colleagues to find out what has been going on.

<Interviewee\\PE_vn680042_transcript_kp> - § 7 references coded [7.39% Coverage]

Reference 1 - 0.93% Coverage

whereas the nature of the risk as a whole - which is making sure that the UK stays under the carbon budget it set itself – is less about things like risk registers and risk ratings and forming risk management, and more about designing processes in a way which allows people to take account of, and live with, risk, rather than necessarily minimising it.

Reference 2 - 0.34% Coverage

There’s a fair degree of consensus because we developed our various work stream plans together through away days and such like.

Reference 3 - 0.35% Coverage

and the policy work streams are more about a gradual progression through various issues. That, essentially, is a little more ad hoc.

Reference 4 - 1.04% Coverage

I think that doesn’t happen as much as it should. I think from my perspective there’s definitely lessons learned from my own experience having been around the department for a while and having done stuff for a while. Generally, one learns lessons from others involved in the process, and where they’ve had these things before. There isn’t an awful lot of centralisation of lessons learnt.

Reference 5 - 0.79% Coverage

I think, yes that is probably how we spread these lessons. It’s just through the water-cooler conversations. Yes, it’s informal discussions with your peers on how they’ve approached certain situations and

sometimes you will learn from other people. So, yes, there is definitely scope to do that.

Reference 6 - 1.22% Coverage

I don't go for full reporting as such, but I have regular catch ups with all the project owners, who are generally the risk owners, every week or fortnight depending on how important the project is, so I can understand how things are going and be able to then update the risks as appropriate or identify new ones. Generally, new risks will generated because there's new projects, or there may be certain external factors which will change the risks as well.

Reference 7 - 2.72% Coverage

Well, in terms of how we assess it, I think I said before [?? 0:41:53] internal project management is pretty qualitative, quite informal. I think that's probably a relatively large weakness in the way that Defra handles risk, and probably the government generally, that there isn't a clear externally defined way of measuring the importance of the risk, in terms of having a proper risk matrix; where you understand "This is what defines low, this is what defines medium," or whatever else. Consequently you have a huge range in different assessments, and what different [rag 0:42:32] ratings actually mean, which is deeply unhelpful as a general rule. Within the mitigation program, we've got our own agreed sense of what amber, red and green mean. It's at least intending to [?? 0:42:49] program, but it's still a high, low, medium rating which is to a certain extent subjective depending on how optimistic you're feeling on any one day when you fill in the risk register. So, I wouldn't say it's particularly reliable.

<Interviewee\RR_vn680040_Transcript_Mz> - § 8 references coded [8.52% Coverage]

Reference 1 - 0.18% Coverage

I think you'd probably have [the 0:02:42] use implicitly, yes.

Reference 2 - 0.30% Coverage

Other than that – yes, we don't hold a risk register ourselves for Packaging as a subset in that area.

Reference 3 - 0.52% Coverage

Is there – a rationale why Packaging doesn't use a, have a user risk register?

Respondent: No, not really. We probably should have one. I think it's just a matter of time.

Reference 4 - 2.65% Coverage

I guess one is, we're looking at the moment with the shift – we consulted on targets on businesses for packaging recycling, and that was under the previous administration that we'd set higher targets. This administration is keener on more responsibility deals, and that kind of thing, so less, sort of, regulatory targets and more, kind of, responsibility as to that kind of thing. And there are risks associated with that, in terms of the current system, where we set the targets and legislation creates a fund of money that's available for recycling, whereas if you moved to voluntarily systems into the fund of money, it isn't created for the state of the businesses. And that's the kind of issue we will discuss within the team, as to, you know, what are the risks of this approach versus this approach? And we don't actually, kind of, formalise them, we just discuss it amongst ourselves.

Reference 5 - 0.63% Coverage

I guess in our area they've been more – because we are so informal in the way it's managed, they've been more focussed on ensuring that those risks have been looked at or mitigated. I'm kind of guessing at this.

Reference 6 - 1.45% Coverage

Yes, I mean, I guess because we don't do a formal risk management, we often don't have the whole picture, as it were, to do that kind of

prioritisation, which might be a quite useful exercise to do, because it is so, sort of, ideas and things thrown around, it just becomes a bit of a muddle of, you know, “Can we do this?” rather than actually giving any specific structure. So I guess that’s a slight hindrance – is that we don’t follow any particular structure to the way we do things.

Reference 7 - 1.32% Coverage

Interviewer: How do you keep up to date on current issues, escalating risks, new emerging risks?

Respondent: We don’t really. (Laughter).

Interviewer: I mean not necessarily formal processes and things. I think most people don’t use formal processes for this.

Respondent: Yes. I mean it’s just discussion within the team isn’t it, when people notice things, or feel there’s a particular risk of going down a particular policy route?

Reference 8 - 1.48% Coverage

I think it’s in – it kind of is, and it isn’t with the identification really, I guess, because we operate in a very flexible way. As I said earlier, we don’t, kind of, prioritise the risks and then sometimes you can miss a risk because we don’t – certainly I don’t, I don’t know whether Judy Kelman does, it may be managed higher up in the team, but we don’t, kind of, stop and consider what the risks are to this approach. They just, kind of, come up as we’re going along to achieving the objective.

<Interviewee\\SC interview notes> - § 1 reference coded [3.85% Coverage]

Reference 1 - 3.85% Coverage

but in policy still ‘old school’ way based on intuition.

<Interviewee\\SC_vn680032 Transcript_B9> - § 4 references coded [3.68% Coverage]

Reference 1 - 0.80% Coverage

Yes. We don't quite put numbers on probabilities, as a whole, but we think this is more likely, this is less likely, this is almost certain, this is

Reference 2 - 2.22% Coverage

So that's our policy objective and in talking to ministers and considering amongst ourselves and with lawyers and the Environment Agency and so on, we'll scope out how far we think we need to go and put advice to ministers on that basis. So I suppose there's an element of risk assessment there, but that's very soft-touch, very qualitative and based on, essentially, expert judgement, or not terribly expert judgement.

Reference 3 - 0.34% Coverage

internal communication – keep upto date on related policy issues

Reference 4 - 0.31% Coverage

but in policy still 'old school' way based on intuition.

<Interviewee\\SH_vn680037 Transcript 7N> - § 2 references coded [0.82% Coverage]

Reference 1 - 0.71% Coverage

If you're just maintaining a policy that's been ongoing for some time then you're – and this is what I was talking about I think when we were talking about you get to implementation stage and you're just growing on; that there is quite a big degree of potential for you to not actively consider the risks in such a regular and sort of

Reference 2 - 0.10% Coverage

and some people will do it in a more informal way

<Interviewee\\TA interview notes> - § 1 reference coded [4.92% Coverage]

Reference 1 - 4.92% Coverage

stages 1-3 still tacit and reliant on expertise, informal processes not explicitly risk.

<Interviewee\\vn680048.wma transcript> - § 1 reference coded [65.47% Coverage]

Reference 1 - 65.47% Coverage

It's interesting, I hadn't really thought of it in quite the way until we spoke, but how much actually looking at risk has permeated into the work that we do. So it's quite stimulating at that – and looking at now in terms of risk, maybe we need to look at that again and try and mitigate some of the things that we've had. But we haven't had a particularly risk based policy, de facto, but it's something we have been doing. So it's not been explicit it's been implicit in what we've done.

<Interviewee\\vn680049.wma.06.04.11 transcript cD> - § 2 references coded [2.43% Coverage]

Reference 1 - 0.99% Coverage

Craig: Do you keep a Risk Register?

Stephen: For the ALSF it is quite unusual. No we don't and maybe we should have done. I inherited that one. It wasn't something that I kicked off and ran with but I was using earlier on as an example of risk register and issue logs as a classic example over a cotton finish sort of project that I was working on. But this programme was a large programme that was up and running but with no really resource input. I have got an advisor and I have got a party that will help out as well keeping tables together but it is a large area of work but we are so understaffed here.

Reference 2 - 1.44% Coverage

but on the rural side there was an old classic way of reporting. Now we are a wee bit in limbo land going up on the whole rural sphere because what we do in rural, we don't actually deliver, we deliver through others so it is an advisory function that we have, rural champion as you say. We are a rural champion across Government to make sure that those Departments creating new policies or new regulations have done so that rural areas and individuals that live in rural areas are treated equitably and fairly with their urban counterparts. And the

issues there are, their issues are not really so much for our unit, although we would maybe get it in the neck if we didn't put our thoughts and points across to other Government Departments, but those other Government Departments don't take them up. The effects are obviously in the rural areas. But that is just a function that we have.

<Interviewee\\vn680050_transcript_Kg> - § 3 references coded [3.40% Coverage]

Reference 1 - 1.75% Coverage

So, I think, yes, I'm not particularly talking about risk tools in what I'm saying, but I think what it's been about is doing the project on control strategy for Classical Swine Fever, it was about looking what the, you know, routes of incursion are. I suppose we looked at different stages. If the disease wasn't here, how can it get here and are we comfortable that the controls we already have in place are adequate to be reasonably confident it can't get here easily. Then it was, kind of, can you detect it, because if you don't detect it, it's going to carry on spreading. And, what measures have you got in place to stop it spreading while it's here and, again, it's, kind of, saying, do it – are there big holes there are the moment, or are we comfortable that that's okay for now, where do we need to focus.

Reference 2 - 1.16% Coverage

But, equally, as they don't want such onerous controls that are unnecessary, so there's – I wouldn't say there's formal risk assessment there, but there's an assessment of the impact of the controls and then it's, kind of, saying, “Look, what's the impact going to be on industry, can we convince the Commission that these meet regulations and meet our objectives under EU law, and are we content from a veterinary perspective that the main controls are still going to be effective and stop disease spreading?” So, there's a, kind of, number of...

Reference 3 - 0.48% Coverage

Balancing, yes. But, in terms of risk tool, I wouldn't say that was a formal risk tool, but it was all about the risk of disease spreading, not specifically a, kind of, you know, some numerical tool that we could easily build.

<Interviewee\\vn680051 Transcript_final_m5> - § 7 references coded [5.13% Coverage]

Reference 1 - 0.41% Coverage

But there are some activities that carry on regardless, and are not managed in a project – through project management methodology. So it's a bit of a hybrid, if you like.

Reference 2 - 0.34% Coverage

So the bits that are on-going are not part of a clear project [?? 0:04:24]?

Male 1: They wouldn't have a structured risk method approach.

Reference 3 - 0.82% Coverage

By the time something tends to become a project, you're starting to get round towards preparing for delivery and delivering elements of the policy cycle. The sort of brainstorming and thinking that goes on before you get to that stage, tends to be much more organic and much less structured. It's much more fluid at the initial thinking stage.

Reference 4 - 0.65% Coverage

In that, as I say, at the conceptual stage, there's very little by way of structured risk assessment. It's all part of the thinking that goes around "We're here, we've got an issue that needs to be addressed. How do we address it? And where are we going beyond this?"

Reference 5 - 0.89% Coverage

Yes. You're talking to people, trying to gather experience from others that may have had a similar situation. You're basically, absorbing a lot of information, filtering it, running things past ministers, highlighting the pros and cons, and the risks and issues

associated with different strategies. So at that point, it is a conceptual analysis of what's going on.

Reference 6 - 0.81% Coverage

I think at the beginning of the journey round the policy cycle, there is no real process involved. It's a matter of absorbing information, filtering it, assessing it, and applying experience and your general policy advice expertise, to the problem – the issue – or whatever you're considering. And it's much more intuitive at that stage,

Reference 7 - 1.21% Coverage

But at the start of the process, it is very fluid. It's difficult to impose a structure on it. I'm not sure that imposing a structure on the initial thinking – the blue skies stage, of a piece of work – is terribly sensible. Because it constrains thinking in a way that may not be helpful, in terms of ensuring that you come up with the best options and the best outcomes. And again, there'll tend to be more ministerial involvement, and senior management involvement, at the start of a piece of work.

<Interviewee\\A vn680046.wma transcript jK> - § 3 references coded [2.88% Coverage]

Reference 1 - 1.55% Coverage

No, it's not widely used because at the end of the day, there has to be an agreement.

We're trying to make things easier for the farming community but, at the same time, there's this directive and deadlines really to meet.

So the word risk is not always used, but everybody knows that yes, there is a risk of slippage, for example, if these meetings don't go ahead on a monthly basis and decisions are not made at these meetings, the papers are not cleared with new research and new analysis at the end of each agenda item, for example.

Reference 2 - 0.62% Coverage

So would it be fair to say that outside the meetings it's a bit more reactive. If something happens that's threatening the ability to deliver, then you'll deal with it. So it's slightly more reactive in that sense

Reference 3 - 0.72% Coverage

Through discussions. We meet them and try and get round the table, sort things out. Internal communication; email each other. I think face to face usually is always a better way because discussions get held. You always find a way round it, somehow.

<Interviewee\\AT_vn680044_transcript_M2> - § 2 references coded [0.91% Coverage]

Reference 1 - 0.80% Coverage

But in our case, in terms of the team I work in, which is, as I say, more reactionary; we don't really have a target, as such, in terms of meeting the – well, we have a target of keeping within the obligations under the Habitats Directive. But there's no targets in terms of –

Data making up code 'respect for experience' (case study one):

<Interviewee\\KM 17-11-10 Transcript> - § 4 references coded [4.61% Coverage]

Reference 1 - 1.04% Coverage

there is built documentation and standard letters etc that we use that mitigate certain risks. So it's covered from a commercial, legal, regulatory point of view.

But nevertheless when you do a design there's an element of risk there and obviously that's where... It's awkward to get a standard thing if you like to mitigate all the risks. When you're designing something we rely upon the knowledge, experience, the training and qualifications of the design engineers basically to actually manage out risk within the designs.

Reference 2 - 1.11% Coverage

And then there's the personal judgement for the finities that you also have. So again there're some things that you have to decide. And part of the decision process is that you factor in. Your personal experience and knowledge and your competence around that really. And people with doing certain roles within the company are, if you like assessed as to for instance our designers and estimators are on a matrix. So in order to, they move through the matrix and gain additional skills. Which is sort of linked to their salary etc and the type of work they do.

Reference 3 - 0.49% Coverage

So as part of that risk I, along with my counterpart on the east we're making a judgement if you like based on expertise, technical and general knowledge if you like of the industry and the work that we're dealing with to come up with a structure.

Reference 4 - 1.97% Coverage

Definitely experience is a massive factor in instilling this really. Because certainly the more you've been working in an environment by default you see some of the things that could happen. And that's sort of instils in to you the reasons why you should do the right thing if you like. I can speak as I've sort of come through the ranks, I've been operational. I've been an engineer switching on the system. And things going on and it sort of brings it to light. So as it goes by it sort of, it instils a... I think it's just generally as you grow up.

I mean we was talking about this the other day just life experience. When you're young you're a bit of a hothead in the car. You race off everywhere. But I mean now through life experience you tend to slow down, you think a lot more. I can't speak for everyone, as I dare say you know yourself. But I think it definitely has an impact, you know your life experience does play a call in the judgement that you take on, on day to day risks.

<Interviewee\DC 11-11-10 Transcript> - § 3 references coded [4.32% Coverage]

Reference 1 - 1.35% Coverage

A lot of it is down to the experience of the people that you're with. As to any risk really, any of the risks. You might be the most experienced person there, but you can miss something obvious that one of the apprentices picks up on. So it's generally a good sort of take everything in from what everybody says.

Reference 2 - 1.62% Coverage

DC: I suppose in a way, when we're working as a team we all rely on other people's judgement and I suppose it would depend on how well you know the people. A lot of people I've worked with for sort of probably the last twenty years and, generally speaking you would probably take their judgement as being good. So, so generally you would use other people's judgement.

Reference 3 - 1.35% Coverage

Interviewer: So your own experience, but also how important is other people's experience that you might have access to?

DC: Yes, that's important, because we've got some really experienced people working here. So you would use their judgement and use their experience to make your own judgements.

<Interviewee\DS 11-11-10 Transcript> - § 5 references coded [8.52% Coverage]

Reference 1 - 1.20% Coverage

It's normally previous experience more than anything else. When I first joined it was all through the rules, but then as you develop through you get your own judgement on ways to do it and that was how it ended up being.

Reference 2 - 2.70% Coverage

Interviewer: How important were the people you were working with in terms of shaping your judgement, how you figured out the grey areas?

DS: They're quite important because they have their own interpretations on them. On the grey areas and you sort of put your heads together and you work out between your own interpretations that you come up with different ways of doing things. A lot of the time you'd come up with different ways, even if you're talking to the same person again.

Reference 3 - 0.22% Coverage

experience or someone else's experience,

Reference 4 - 2.06% Coverage

Interviewer: What would you base your judgement on, on how would you judge the potential severity? What would you base that judgement on?

DS: That would be again past experience or from the third person, so if you speak to someone about it another time and you might have heard them say what might had happened if they had done it a certain way, so it's like that.

Reference 5 - 2.34% Coverage

DS: There's normally enough with just the people that you work with, their own experience of it, because I was working with a bloke that had worked here for thirty years, so his experience was quite vast and he'd seen most things. And then you'd obviously get like engineers turn up and you'd have their opinions of everything. So there's always enough experience to cover the judgement area of it, it's just the rules.

<Interviewee\GB 10-11-10> - § 6 references coded [46.50% Coverage]

Reference 1 - 6.80% Coverage

So it is quite empowering, in terms of making decisions in terms of how we run the company and how we run our own reports, and things like that, all those guys make all of those decisions. However at the end of the day there is a top line that says we need a set amount of criteria, anything additional to that 'off you go,' help yourself use the team as you like and that would generally be the same in the west as well, in terms of the team there. However, I would caveat that with the fact it does depend on how experienced the team was, in terms of how much autonomy you give them, let them loose for want of a better word. And there would be periods, certainly this year, when we have been quite controlling. We had a third change in the number of staff in the East area here, in terms of recruiting new staff, and we had a third of our staff actually change roles, or we got an additional third of the staff in. Now that is quite a big change in that area, and I think there is an area there where you turn around and say well, 'I am going to control this,' and you step back into the control aspect.

Reference 2 - 4.98% Coverage

And then there is an amount that we actually sit people in the business, well this is how we want you to operate and then from there onwards, once people are skilled in terms of understanding how we operate and what we do on a day to day basis then they get the opportunity to make decisions based on their knowledge around that. So there is an element of control up to a certain point but after that it relaxes.

Reference 3 - 8.08% Coverage

Craig - does that impact on your ability to manage risk?

Greame - ummm not, its doesn't impact on my ability to manage risk because we have

to manage risk in a different way. We have to engage with our alliance partner and get them to do some of the risk assessment, the guys will do risk assessment themselves sometimes, they will take a car out to a site and have a look some of the risks on site. So they are fully aware of the risks that are out there,

Craig - But do they have the relevant experience of all those risks to make the right decisions?

Graeme - possible not some of them, and that is why we engage with our alliance partner to bring some of that experience in, but its a hand-off all the time. So whilst I recognise there is a gap in my team I can't fill that gap at this moment in time, so I have to back fill that expertise or that knowledge with knowledge from another part, from the delivery part of the business. So your always using a second set of eyes. I mean it will build up, of course over a period of time. But if you only have people who have been in the department for six years, i think, there seems to be a cultural thing within, in general in organisations these years, that if you have been there six years you have been there too long and you start to move on.

Reference 4 - 5.38% Coverage

Craig - an how far, whats your opinion how far up the heirarcy in the organisation preactical experience is useful.

Graeme - well I would say that it is, personally its very useful upto my level, you could arge above my level my boss is more of a strategic manager in terms of understanding EONs drivers, and the driver of the business rather than the technical aspect of it. But since I manage the design and estimating team I think it is only right that I have a full and frank understanding of hte activity that is carried out, on both sides actually in terms of an appreciation, because at the end of the day somebody has got to sit there and say my team need training in this, this and this. If you haven't got that knowledge set, then I think it is very very difficult to appreciate what the guys haven't got as apposed to what they have got. SO I think, certainly my level, the level down for where I am, my managers are not experienced in a delivery qualification but they are very technically qualifide in terms of understanding what they guys need to do their day to do job. So its difficult, if I could have a split of team, I would like 50% of those guys in my team to have operational experience because I think it would benefit them, but I know that at this particular moment in time that is not going to happen. So, I think it is important but wether I have got it or not is another thing.

Reference 5 - 12.19% Coverage

So we use expertise in terms of their knowledge as well. from a commercial and regulatory point of view I would make decisions on whether it is right or wrong to make a charge in some instances or whether it complide from a time scale. but again as a backup from that there is a commerical and regulatory team that I have very good relations with. They are a good backup in that respect as well.

Reference 6 - 9.28% Coverage

Greame - I don't expect, I suppose the formal proceedure and hte laid down guidelines, that's fine for certain aspects, you've almost got a ticksheet on some of the things we can look at and go 'does it comply to this, this, this and this - yes that's OK

or that's alright.' But what I would expect is that a lot of the guys, because they haven't got certain types of experience that they have counseled somebody who has got that knowledge. And it's usually covered by way of an email to somebody, so we send somebody an email: 'we've got these issues can you please comment, I need to make a decision based on this, this is what I want to do, and these are the issues.' And they will get a response back. Every single time the guys will save that response, and it goes into the design file. So it's fairly risk adverse, or arse covering. It can get like that sometimes, I think we have been bitten a lot of times in the past over, you know we have been told, and people say 'oh no I never said that.'

<Interviewee\FG 11-11-10 Transcript> - § 9 references coded [21.80% Coverage]

Reference 1 - 1.29% Coverage

Well you see in theory that's, you know if you've got you know the more experience you've got within the organisation the better chance you've got of looking at what risks are about and how to deal with them risks. You see some of the, like the younger generation they just come along, they're there to do a specific thing that they're told to do and they can't possibly see the risks that us older people can see and where know about.

Reference 2 - 1.09% Coverage

Well I don't think they do. You see that's possibly why we'd, you know certainly in the East that we're taking them under our wing and trying to guide them into the right direction that you know that they should be thinking about what risks they can come across and how to deal with them risks. Because that is, in theory that's an important part of their training.

Reference 3 - 2.45% Coverage

Interviewer: So in addition to the sort of procedures, the equipment that comes to you the sort of experience and sort of wealth of knowledge and awareness that you get through that, does that have a significant, play a role in how safety you can operate?

FG: I think it does, yes. Because you see well I'm getting to the end, I'm getting towards the end of my working life but basically what a lot of my work is at the moment – from now is bringing young lads

on. I've got one lad with me he's acting as a Mate to me but he's just finished a four year apprenticeship with one of the contractors that we used to employ. And he's been TUPE transferred over to our Alliance Partner and he's with me now for me to put him in the joint hole, see what he can do and bring him on so that he's up to the standard of...

Reference 4 - 1.74% Coverage

Interviewer: So learning that experience or learning, passing on that experience is done with the people you work with directly your sort of peer group, that way.

FG: Excuse me. Yes because at the end of the day I know what can go wrong, not all the time but I've probably been there, I've had that happen to me, I know what the consequences are and I don't, you know. If I can stop it happening to somebody else by giving them a little bit of information what is important then at the end of the day I've probably saved another accident or probably saved somebody's life.

Reference 5 - 4.34% Coverage

Well it, basically it meant you were relying on people what you'd got and if like, if there was people what wanted to leave or people that was coming to the end of their working life you'd then got nobody to replace them. And the only people that you could, in theory you could use was you'd got your existing staff that you could promote upwards but you see there was nobody there to back, to come in to take their place. And then it got to a stage where the staff levels started dwindling in the sense in that the expertise was not as good possibly as they should be. Like they started, they had a [row 0:11:37] about where they bought when they closed the contracting side of, when it was EME and they trained some of them up as Jointers and Linesmen.

Some of that staff, soon as they'd done the training course they thought they was Jointers and they're not. You've got to earn, it's not a case of going off to school and doing all the joints that we've got in our regime because there's no two joints alike. And it's all about and it's totally different doing a joint on a bench to what it is in a joint hole for water. And it's even worse when you come to do it at night when you're working with artificial light and you're standing in shadows, you get all these shadows and all that sort of business.

And you know you've got to really, you've got to be really on the ball as to what you're doing. And you've got to focus on what you're doing.

Reference 6 - 4.74% Coverage

Mentoring in the field it's – doing it in a classroom is alright in one respect but you see you only, in a classroom you only get one crack at what you're doing. So like you go there for, you go to the school for x number of weeks and you'll do one of each of the joints what they think you should be trained at. But when you come out on to site you're in a joint hole that probably, like this time usually'll be full probably with water. You've got other utilities in the ground with you it then gives you the practical sense well I've not got the room here as I had when I was in the training school. I've got to be a lot more careful of what I'm doing you know I've got something six inches away that if I don't shroud all up and shroud that up there's a big chance that I could have a flash over from it.

You know that's and that's, you only get that by doing it out in the field and somebody possibly like myself showing them in the first instance of what they've got to do and then let them follow suit. And basically you keep an eye on them. And personally onsite trading is the best thing that you can have you

know you get used to, you get to know all the different ins and outs. You come across all the difficulties that you don't come across at the training school and to me you can't beat onsite training.

And luckily this company at the moment once a person has done his four year apprenticeship then they give him at least another 18 months after that under supervision to gain that additional experience off the person that they're with. And to me you can't beat that.

Reference 7 - 2.30% Coverage

But basically we do all the risks as a group you know whether there's two of us, six of us we all have a little get together, right this is what we've got to do, what's the risks we've got you know we've got to take into account, you know sort of what traffic are we looking at? What pedestrians are we looking at? Are we blocking people's entrances up? What have we got to do to keep them, you know to keep on the right side of the customer? Because at the end of the day we're working for the customer and we've got to make sure that customer's safe while we're doing what we're doing. And part of that does come from experience but it also, sometimes if you've got a fresh face there they can possibly see something that us older ones probably just take for granted.

Reference 8 - 1.12% Coverage

Interviewer: So when would you and when would you not rely on somebody else's judgement in making a decision on risk?

FG: It's probably somebody that's probably not got a lot of experience. If they're not sure of what, you know what you're trying to talk about. It's sometimes you get people what they've probably not, only been in the industry say five/six years.

Reference 9 - 2.72% Coverage

But through my experience I say well we should be ten metres away from that damage before we could sooner put in a repair in. But obviously if you go to that ten metre point and through the experience that a tradesman has got and you do all your necessary testing on the cable you then can say to that Project Manager “Well this cable is perfectly alright to put a repair on.” Or “There’s something wrong with it we might be going x metres further back and trying again.” Because at the end of the day we don’t know how far the soot and carbon’s gone up that cable, we don’t know how far the moisture’s gone up that cable.

So you know it’s a combination of the two really. There is certain thing that’s written down but they’re written down for guidance as to what you should be doing. But obviously the older you are the wiser you become and that’s when they start talking to the wise owl as I would call it.

<Interviewee\\GT 17-11-10 Transcript> - § 4 references coded [5.87% Coverage]

Reference 1 - 1.23% Coverage

That’s interesting. More expertise, because certainly in the past we’ve done things which is more...almost a voting type thing, of 20 senior managers and actually getting some weighting of how that falls.

I think now we’re more towards – there are experts in each area. But that’s what we do as a Board. Clearly, experts in each area always think that their risk is the biggest risk, and so when you collate them all up everything is at the top right of the diagram, effectively.

Reference 2 - 0.67% Coverage

Generally it’s very positive. You’ve got a lot of experience there, you’ve got a lot of these values and culture. Things change slowly over time and therefore you do get a core kernel of doing the right things, behaviours, values, and what we’re trying to do.

Reference 3 - 1.31% Coverage

Interviewer: Is that gut feeling based on your first hand experience? What are you basing that gut feeling on?

Respondent: Yes, my experience and the experienced people around me. It's hard to write a manual on it. I've been in the job for five years now, most of my asset management directors have been in the industry for 30 years so there's enough expertise around to actually challenge and test each other and say "does that feel right, as far as that level of risk we think we've actually got there."

Reference 4 - 2.67% Coverage

Interviewer: So is that situation where the written procedures didn't really fit the situation, then that was escalated up to you to make the decision of whether it was okay to change the procedure? So people who work for you, if a situation occurs where there is a procedure that they have some reason to believe is not appropriate for a particular circumstance, what would you expect or require their judgement to be based on, that that wasn't the right thing to do?

Respondent: One, trusting their judgement of these individuals, generally they're experts in their field, trusting that they get counsel, but then having the confidence of going up the chain very quickly – if it's critical make the decision there and then, having enough empowerment from the directors to make those decisions there and then that's required. So, a control room engineer who sees faults, things like this. But, in the understanding that if it's a certain risk or size, then there's a very clear escalation principle that they can get the decision quickly.

<Interviewee\\JO 9-11-10> - § 3 references coded [13.42% Coverage]

Reference 1 - 8.56% Coverage

And then in my experience there are a number of fairly high profile accidents over the last twenty or thirty years which colour my qualitative judgement fairly significantly. An example, Hatfield rail accident, I think the rail was at the side of the track, two new maintenance workers or two new maintenance managers went into the backlogs and cancelled them all. If we go from one system to another I am paranoid about not losing the outstanding defects and making sure they have been transferred to the new system. And that they are all risk assessed and managed. So there are a number of those events that I have studied and personally take lessons from.

Reference 2 - 8.56% Coverage

Jim - sorry the Baker report on the Texas oil refinery, has I don't know how many people's judgement that has influenced. One will ask continuously, one of the lessons from that is what field of risk here haven't I looked at. Because they were getting great health and safety scores, but they ignored the process risk safety scores. So what are the aspects of this project that I have not looked at, that might turn out to be a risk. That's one of the lessons from that. The X hundred recommendations of the Baker report.

Reference 3 - 5.03% Coverage

We are all familiar with the Kennedy example 'bay of pigs' where the definition of group think comes from. So I am sort of paranoid about being sucked into group think, but there are times when you know that group is going to make a better decision than the one I was going to make. And do I have the ability in myself to either give way against my judgement or change my judgement based on the evidence that they are presenting. Those would be the two circumstances.

<Interviewee\\JS 12-3-2010VN680010 Transcript> - § 1 reference coded [1.31% Coverage]

Reference 1 - 1.31% Coverage

I think erm I've got examples where it's been very reactive. And erm it's harder to do the proactive but we are doing the proactive work because for example if we're putting together an unconstrained budget that's more money than is in the either E.ON business plan or [?? 0:42:43] then we are saying more needs to be done and that might be for safety or legal perspective based on our good engineering experience.

That is harder to get through the business than an incident causing something.

So you're absolutely right erm we'd have more hurdles put in the way.

<Interviewee\\KP 11-11-10 Transcript> - § 3 references coded [6.04% Coverage]

Reference 1 - 0.75% Coverage

You see things and then I teach apprentices, I've got two apprentices with me and they often ask me "Why did you see that because I never saw it?" And I'm like trying to explain to him may be 28 years of experience of assessing things because we've always assessed it even though we've changed the way we assess things now.

Reference 2 - 0.71% Coverage

Interviewer: And you yourself where did you develop your this awareness?

Respondent: I've been here from school. I've been here from school and I was taught by... Like old... From, how it was with me is that I was with an old bloke who taught me and now I'm the old bloke who's... That's how I perceive it.

Reference 3 - 4.58% Coverage

Interviewer: So when, so on the judgement and particularly on your sort of individual judgement you've already talked about this a bit. So when would you not primarily rely on your own judgement in making a risk decision?

Respondent: I'd always go on my own judgement and if I thought it wasn't right that would be it and we would, you know I'd go to an EDS or a Project Manager and sort of say "This is the reason why I think that..." We come across it quite regularly. I had one yesterday I was working on a junction, the Council gave us permission to work 10 metres/15 metres from the junction but the footway was right near the junction. I go to the Project Manager "I'm going to have to need traffic lights. And we're going to have to do it after six o'clock at night."

So that's my answer. There was one yesterday then what happened was we got the traffic lights at six o'clock, Council agreed with everything what we said to do so six o'clock we

got traffic lights, I went back there and did the job last night. So you know it all goes down to the person on site. It can't come down to him... Because if they go there one day and they think "Well we're just going to have this hole just here." That's okay but everything isn't rosy like that is it? And things change. A car might have parked there or blah blah blah so you can't do the job.

So they rely on your judgement.

Interviewer: Okay. So in terms of the organisation relying on your judgement or you coming back and saying "You can't do it this way." Does it matter that who, the person you're talking to, the authorising officer or whoever it is does their experience matter in...

Respondent: Well the, generally what happens is is that the lad that the job like what we've been just, we're talking about, he relies on myself as having 28 years of experience to his 2½. So yes he might have been my boss but he also listens to what we have to say and he's developing from that as well.

<Interviewee\\PG_11-11-10 Transcript> - § 1 reference coded [1.37% Coverage]

Reference 1 - 1.37% Coverage

Well I think the difference with some of the asset programmes and replacements is some people do it some people don't. I mean I'm the only one that I'm aware of from of a delivery manager who's actually gone and actually done some work for network strategy. Because it shouldn't really be my role but I'm conscious because I've lived in Lincolnshire all my life I know what the state of my network is and what have you. So I'm conscious I know what age profiles of these are, past lives different roles I also know what the asset condition is. So clearly from my

point of view I think it's part of my role to identify to network strategy saying "Look these assets need to be replaced."

Interviewer: So you had information that they didn't have in there?

Respondent: 35 years worth of local knowledge, working on the system. As I say I've been an operational engineer in Lincolnshire.

<Interviewee\\AL 9-11-10> - § 15 references coded [87.60% Coverage]

Reference 1 - 3.59% Coverage

Craig - So all those risk based decisions that you are making, what sort of things do you draw on to help you make those decisions.

A - probably all the years I have been working in the industry. because I was taught right from the very beginning there are electrical risks, mechanical risks, there's roof leavking, there's roofs falling to pieces. I suppose vigilance is probably, the fact that you have been trained as well so you acutally go in ticking these risks off mentally. You not going to the ticksheet and going I must look for this, I must look for that. Its mainly born from experience.

Reference 2 - 5.98% Coverage

would probably be a little bit more vigilant when I am going into the customer ones, because I know from experience that they will probably have been neglected from a safety point of view, but if I go into one of our own substations I automatically do all of our safety checks anyway but I am not, most of hte time, going to walk into something obvious like a hole in the floor. You know, don't get me wrong, it is possible from accidents that may have happened. But I'm not expecting the same hazards in one of our own places. Another thing you have to take into consideration is that I am a lone worker. Not two of us, or a mate, I am on my own.

Reference 3 - 13.70% Coverage

Craig - Why is it that experience and not a sheet of paper saying you need to check these things when you go into a colueary?

A - because, I don't think that every sheet of paper covers all that risk on that site. There are mining colueries and colleuries that are shut down and just pumping water. And alot of ones pumping water are less of a risk than ones that's acutally working, minging coal all day. There is more vehicular activity on site, so straight away when you go into one mine thats been made redunant I know I've not got that but there is going to be more risk from picking shards of glass from vadilism and things like that, but on a site that's working there's not. So you sort it down to even what you are wearing on your feet, but it seems to come, although its drummed into us its PPE this, it's PPE that, I know very well that if I need to up my game a litte but I can do that based on experience from the five years as an apprentice with tradesmen, so

something that you learn at an early age in your life, and the earlier you learn the safety culture the more it sticks. Plus the fact during my employment years I've been in some nasty situations from suicides, electrical suicides, fires, so I'm always aware and I have always seen the worst case scenario. So it's not a case of 'oh this will never happen' I have seen it happen. I have seen both sides of the coin through my extensive employment history in the company.

Reference 4 - 13.70% Coverage

Craig - who are the main influences in creating that attitude to risk, is it your peers, your immediate manager, or is it the CEO or...

A - I would say it's your peers, it's the people you actually worked with in a similar environment. No disrespect but you get a manager that's a manager, but they've got no coal face experience. The other way you get a manager that understands this but he did that and has been promoted to this. So it's a lot easier to talk sense to this guy, than it is Bill he's from Scotland he's another manager, what they did before well he was in charge of the nuts and bolts. So because he's not had that exposure to it he doesn't fully understand that risk, but what he would understand is you know, you've got to dot the I's and cross the T's and put an apostrophe in there, colour that yellow. He'll understand those procedures and if you don't follow those procedures you'll be in trouble, but he probably doesn't fully understand that procedure.

Reference 5 - 10.57% Coverage

I wouldn't say, there is no time pressure when it comes to safety, that is my feeling and that would be the way I picture it. You are best looking at something three times, than get it wrong the first time. So I don't think I would come into a situation where there is any time pressure on a safety judgement. As I say I know myself walking in to the site, looking around: what sort of site is it? It's a steel works. There's risk of that, there's risk of coal falling, there's a conveyor belt. You're doing this as your walking in, as your actually approaching where you want to get to, so not like look for this, look for that. Even rabid dogs, animals that get in the substation, some cats or anything, everything carries a risk, but it's being vigilant, it's not like you have to go in wearing steel gloves to everywhere in case there is a cat in. You just look around, you get a feeling, is it close to a woods? Lots of tall grass, you just gotta think ahhh, you see signs of rat droppings, you know Wheelers disease. You just know what your looking for, alright there might be the odd clue, food trays where they have been in with rat poison that kills them, so you are going to know. If there is one of those there you might not see a rat but there is a potential hazard. Potential risk from Wheelers disease. I think it's as I say, because I've been in the industry all of my career.

Reference 6 - 10.57% Coverage

A - I think that, very often when there is a group of people, you very often learn from the most experienced. Everybody has to look, potentially face that risk sometime or another,

Reference 7 - 9.45% Coverage

A - I would say when I was an apprentice I actually served 5 year apprentice, and most of that time I served with different tradesmen. Like learning the trade as well as

learning cultures. I don't think it quite happens like that any more, the latest one is when set trainings or apprentices on, they tend to put them on a two or three year program to get them through a qualification, ie. college. but I don't think they are giving these people enough time with the more experienced tradesmen, because you can learn a lot more by sometimes watching a qualified tradesman's approach, that you can say 'oh it's in the book in these circumstances we do this, we don't, we do the other' And because we are working on live electricity a lot of the time in the ground, then I think it is sad, that that seems to have gone.

Reference 8 - 9.03% Coverage

well obviously I have been involved with other people's experience in the jobs I have done over the years, and when you have to sit on a formal tribunal investigating an accident you understand what happened, understand the failings of the individual or sometimes you've got to look at the failings of the company. They are not legislating for that risk, but there aren't many situations where if somebody is vigilant enough that most risks are covered, there's always unexpected, if you go in somewhere and there is, hundred, million to one shot something could explode in there because the electrical is going through,

Reference 9 - 18.25% Coverage

Craig - In, how much a role does the organisation play in the ability of people's ability to learn from other's experience, I am thinking of this guy I talked to, a joiner, and he was saying there is no one place where he and other joiners can gather together, like a tea room, so he has lost that ability to learn from other people's experience.

A - What we've got now, they don't do five year apprenticeships anymore, that's out, too expensive. We have like traineeships, a smaller amount of time for people to learn, right. But what they do they give the technical training, they know that X equals Y and Y equals X and bla bla bla. What, that is the theory, but they don't seem to be able to get any practical training, which to send a guy with another one of those joiners, if you are working for a year as his mate, when I say a mate I mean a two man team, you don't look for any money because whether you are doing that or that man needs another man with him, they work in a two man team. But he's then able to learn from the more senior guy, because the thing about joinery, because I was a joiner, they face big hazards everyday because they are actually digging down in the pavement, digging through soil sublayers, all descriptions, connecting gas works, water pipes, NTLs, Virgin, all sort of ducting, then actually to manipulate on a live cable everyday. And so their safety precautions are a lot more. But once again they can always shout up and say 'I am not happy with the way this is, I would like it made dead, this is the reason.' And no one to this day would say 'sorry I don't agree with you we will send a more experienced man,' because that just puts that guy off doesn't it? So we don't have that culture where we learn some of those elements you can't be taught in college or in university, you can't be taught experience, I can fill you with knowledge until your eyes water but what I can't give you, nobody can put an injection in your arm called experience. That can only be given by hands on.

Reference 10 - 18.25% Coverage

Craig, so then another way of putting the question, if you are so and so director or whoever you are, how do you instill and develop good risk judgement in the people

who work for you?

A - In the old days, and by old days I mean pre 2000, what you had, you had a numbers of teams, like ten jointers, ten teams, they would be allocated to a foreman or supervisor. How that supervisor was always someone who came off the tools, and this supervisor would be visiting all ten teams on a daily basis. And as being one of these people, it was part of my job to get to these sites that have got a problem. Stop them, and not nurse them, but guide them through the risk management for that particular scenario. But most people only need the telling the once, 'oh I see what you mean, if you do this this way or don't dig right there, put a small piece of triangle and dig there, oh I see what you mean.' You have got to accept there is an extra cost in that extra meter of ground, but your extra meter actually is the difference being the job being safe, and nothing might have happened, but if they had happened to hit somebody, a member of the public or a vehicle, its like saying to these people, 'don't do it everytime but obviously where there is this situation, this is the way to approach it.' Or there might be different incidence that they, or different briefing, and they don't quite understand, then you go and give them a practical demonstration of that. But we don't have that foreman anymore. That position doesn't exist.

Reference 11 - 18.25% Coverage

Craig - And, what has the impact of that been, has it reduced the good judgement out there?

A - Well, I would say that, there is nothing like getting ten people together and having a bit of a jolly anymore. That's not the culture of the organisation anymore. Training, don't get me wrong all the training is there, but what you can't give these people is practical experience. As I say you can make them understand the theory of what you are doing, but theory and practice are always two different animals.

Craig - Is there, already, do you see coming, an impact from that?

A - well your impact is your increase in accidents, because there are skills that they don't have. So what we are tending to do now, we are trending to recruit from all sorts of different industries, that may be these two lads have been farmers. There has to be a certain level of intelligence to do the job period. And most of the skills that you need, for the hands on practical skills, add to that the knowledge from training, add to that knowledge from two days of day school, night school, anything. But what you never throw in there is objection of experience, and that is something that you cannot legislate for, you cannot write down, its like anything, like how did you try to tie your shoelaces. Somebody showed you, didn't they. How did you learn to tie your tie, somebody showed you. You learn best from being shown how, they won't show you the wrong way to do it, they will show you the way that works best from their experience.

Reference 12 - 5.83% Coverage

Craig - So is this trend, continueing or has there been a swing back so that experience is valued again

A - no I think at the moment we are sort of in the middle of all this. Personally, its

only my opinion, but I think at the moment we are sort of in the abyss, right. Since the companies been the way it is now, under EON, there has been more switching incidents than there ever was. These are incidents when people, switching on the 11 kv they can actually do things wrong, its not unsafe, but it switched people off. And there has been more of these incidents than ever, at my career upto 2000 in the company I probably heard of three of these incidents in all of my 40 year career. Over this last ten years, I've been in management of a service provider, Morgan utilities, now I find myself to be transfered back to this company through EON bring me back in. There are more incidents now than there ever was, it would probably be good for you to talk to one of our control engineers. Maybe you should have one of those on your list. They actually work in here on the next floor up.

Reference 13 - 5.83% Coverage

Craig- And that increase in switching incidents is because of less experienced people doing it?

A - yes absolutely.

Reference 14 - 7.02% Coverage

Craig - and, I talked to a guy from SHE, and they put up posters and things of had happened in the EON organisations, and they had people who had had an accident tell other about it

A - If anything happens we have what we call a safety bulletin, and that safety bulletin comes in in a very short space of time. But very often its sometimes something that you cannot avoid, it might be a manufacturers fault or twenty, forty year old switch gear that all of a sudden somebody has operated one of these switches and a springs broke. Now what we do is we embargo every one of those types of swtich until such time as we can do a modification of it. So we are not putting ourselves under unessissary electrical hazard by operating something that in another part of the district, in another part of the country a springs dropped off and caused a flash over. A bit like the royals royce engine but we don't know what it is yet, so the engine has come back to royal royce and they will do a full investigation to say if its safe for the jumbo 380s to carry on, or no it can't done. But they would never have put those engines in service knowing there was a problem. So they couldn't forse that, so the retrospective legeslation called MOD will take that into account, but until then there are hundreds of these planes flying in the sky.

Craig - So there bulletins are they effectice then?

A - I would say so yeah,

Craig - Do they influence you, in the decisions you make?

A - personally yes, because I might keep an eye out for this kind of switch gear thats known to be X, or failure of Y. Or keep an eye out incase it starts to rot at the boack. So your looking at all that as well.

Craig - So, the arenatuics held as an example of being very good at risk managment,

and the characteristic of them they will immediately start talking about, 'oh you heard about this incident,' and they will start discussing the details.

A - yes the more important the incident the more emphasis given

Craig - and does this happen in EON do people discuss incidents?

A - Oh yes, if there is any major problems then and if they feel its needs more than just sending a bulletin out they will do that

Craig - Could they do more of that or ?

A - I think its imaterial, its six of one, six of the other.

Reference 15 - 4.39% Coverage

A - with that if its sheering the sheep. but I couldn't go and sheer a sheep. But if you show me how to sheer one I will give it a go, wahts the risk from the cutter? Do I need any special gloves? ANd if you get people asking. right, rather than just taking a flyer at it. Becuase they can't see a hazard if they don't have the comprehension to know what the hazard could be. And this is the same as the trainee I think, if you've got electricity going through OK, behind that, protecting that is a 600 amp fuse, and your working on it, its not like a 3 amp or a 13amp in your socket at home. The chances of getting electrecuted are the same but potentially if anything goes wrong with the cable you are working on, you'll probably end up being on fire before the fuse goes, that will not happen with a household fuse. But you get an eletic shock from both, but the potential for that to cause a bigger hazard although same electricity, same voltage is much higher. So its that I don't think that we instill into our jointers, or fitters. Becuase we are taking on a range of skills sets now, were before we took them on at 15, 16 and trained em. We now take on people in their late twenties. Now by your late twenties you have become very much established in the way you think. And I would say those people need a little bit more training, especially on practical rather than theoretical because they have come to the stage in life where they know best. I'm 28 lived a bit, I know best. We have all been there, forget office safety, lots of decision in life are based on how you forsee risk. Wether its putting ten pound on a horse or...

<Interviewee\\CS 10-11-10 Transcript> - § 1 reference coded [1.22% Coverage]

Reference 1 - 1.22% Coverage

Interviewer: Okay. So you're relatively new here. So in terms of learning how to do things and how things were done, what have you mostly relied on? I mean, something like this or people around you?

CS: People around. I think that there's a couple of people that used to do this. Be responsible for this. And up until maybe a month or so ago, maybe not even that long. I think it's probably a couple of

weeks ago, I was – there was another person kind of – we were jointly responsible for doing that as he was handing over to me. So it was kind of like just handed over from somebody else how the process worked.

Appendix H: Peer review of coding

Table H.1.: Summary of peer review of selected codes by two peers (JD and FS).

Original code	Code description JD	Agreement between original code and JD	Code description FS	Agreement between original code and FS	Final code (if changed from original)
use of experience throughout the hierarchy (Table 4.1.1.)	Situations where judgement is used	Y	Use of judgement	Y	
Risk Management tools (Table 4.1.2.)	Using models	Y	Models	Y	
Industry standards (Table 4.1.2.)	Best practice	N	Codes of practice	N	Industry best practice
Data (Table 4.1.2.)	Qualitative data	Y	Data	Y	
Colleagues (Table 4.1.2.)	People's experience	Y	Experience of others	Y	Colleagues' experience
Superiors (Table 4.1.2.)	Line manager's experience	Y	Escalation	Y	
Codified rules (Table 4.1.2.)	Procedure	Y	Manuals	Y	
Expert consultation (Table 4.1.2.)	People (experts)	Y	Consulting experts	Y	
Individual experience (Table 4.1.2.)	Using own experience	Y	Experience of decision maker	Y	
Lack of coordination and communication (Table 4.1.7.)	Poor explanation of risk management strategy (no communication)	Y	If communication is bad then motivation to coordinate drops	Y	
Respect for experience (Table 4.1.6.)	Two way communication across hierarchy / experience is highly valued	Y	Experience is appreciated up and down the hierarchy	Y	
Importance of line manager experience (Table 4.1.6.)	If manager has no experience he or she cannot understanding decision of more experienced individual	N	Shared experience/tacit knowledge important for communication	N	Importance of shared experience for communication
Individual experience (Table 4.2.1.)	Individual experience	Y	Experience of implementation	Y	
External stakeholders (lateral knowledge transfer) (Table 4.2.1.)	Debate with stakeholders	Y	stakeholders	Y	
Informal communication between policy teams (lateral knowledge transfer) (Table 4.2.1.)	Network with work colleagues	Y	Horizontal networks	Y	
Specialist advisors (lateral knowledge transfer) (Table	specialists	Y	experts	Y	

4.2.1.)					
Delivery body*	People from delivery body	Y	Delivery body partners		
Codified lessons learned (Table 4.2.1.)	Formal reports	Y	Written lessons learned	Y	
Culture of collaboration (Table 4.2.2.)	Organisation's culture encourages communication	Y	Tacit expectation to call in expertise	Y	
Risk registers and team communication (Table 4.2.2.)	Risk register encourages communication	Y	Risk registers support routine communication	Y	
Lack of knowledge retention (Table 4.2.3.)	Staff loss	Y	Change causes loss of local knowledge	Y	
Lack of financial resources (Table 4.2.3.)	Limited money	Y	Budget cuts	Y	
Lack of time (Table 4.2.3.)	Limited time	Y	Lack of time	Y	
Lack of formal knowledge sharing (Table 4.2.3.)	No procedures to share knowledge	Y	No exchange of experience	Y	
Formal risk management practice (Table 4.3.1.)	Risk management following formal, well established procedure	Y	Believers in risk management process	N	
Informal risk management practice (Table 4.3.1.)	No process, casual risk management	Y	Informal risk management	Y	
Not driven by risk at all (Table 4.3.1.)	No need for risk management	Y	Informed resignation from risk management	Y	
Going through the motions (Table 4.3.1.)	No need for risk management but following procedure	Y	Box-ticking	Y	
Informal consultation and collaboration (Table 4.3.3.)	Group discussion	Y	Casual discussion	Y	
Leadership expectations (Table 4.3.3.)	Doing what the boss says	Y	Top-down expectations	Y	
Codified processes (Table 4.3.3.)	Following rules and procedures	Y	Manuals and rules	Y	
Experience (Table 4.3.3.)	Personal experience	Y	Own experience	Y	
Stakeholders (Table 4.3.3.)	Groups discussion with stakeholders	Y	Stakeholders	Y	
Not formal guidance (Table 4.3.3.)	Not rules or procedure	Y	Not written rule or guidance	Y	
Training (Table 4.3.3.)	Training and personal experience	Y	training	Y	
Normative (Table 4.3.3.)	Bosses expectation	N	Normative expectation	Y	
Individual pragmatic legitimacy (Table 4.3.3.)	Influence of work environment	N	Pragmatic compliance	Y	
Direct stakeholders (Table 4.3.5.)	Everybody who uses the policy and the affected public	Y	External beneficiaries	Y	
Department's reputation (Table 4.3.5.)	Department's reputation among other departments	Y	Inter-governmental reputation	Y	
Avoiding making mistakes (Table 4.3.5.)	Reduce bad decisions	Y	Avoiding bad policy	Y	

Take on risks (Table 4.3.5.)	Make and implement decisions faster	N	Reducing uncertainty barriers to making decisions	N	Make decisions despite risks
Facilitate participatory risk management (Table 4.3.6.)	Encourage communication within teams	Y	Integrate staff	Y	
Demonstrate risk management activity (Table 4.3.6.)	Communicate risk management activities to others	Y	Framing practice in risk terminology	N	
Unnecessary bureaucracy (Table 4.3.6.)	Not needed, meaningless process that nobody will pay attention too	Y	Useless exercise	Y	

Appendix I: Further data for Tables 4.3.5 and 4.3.6.

Table 4.3.5.: Conceptualisation of risk management

This table describes how participants conceptualised what and who risk management was for. This reflects underlying assumptions about risk management's role within the organization. The data shows an overall lack of consensus as to what and who risk management was for. The main perceived beneficiaries were the reputation of the Department and the end customer. Perceptions of the purpose of risk management were more diverse. Purposes described ranged from producing good policy, to benefitting the reputation of policy makers, to benefitting the individuals involved in developing policy.

Main code and sub-codes	Sub-codes	Example
Main code Beneficiary of risk management – <i>the participants' perception of who or what the main beneficiary(ies) of risk management are.</i>	Direct stakeholders	“If you are going to look at the real big picture, then I would say it should be of benefit to whoever your end customer is because you are doing something in a way that you have really tried to take on board their thoughts.”
	Department's reputation	“Then I guess I'd be more focused on the reputation risk to the department.”
	Minister(s) responsible for policy	“And if it's done properly I think the ministers are beneficiaries. Because a minister can lose their job over a badly managed program or something like that.”
	Government's reputation	“Beneficiaries? Well I guess we are pursuing government policy so I mean it is the government so to speak who are in certain ways the most direct beneficiaries.”
	The public	“So ultimately I like to think that the public benefits.”
	Project team	“In a public organisation I mean the obvious beneficiary are people who are working on whatever particular project or piece of work they happen to be doing.”
	Person formally responsible for risk	“Probably the senior reporting officers, so the people who're actually responsible ultimately in name for delivering.”
Main code Risk management function – <i>the participants' perception of how risk management delivers its benefit.</i>	Avoiding making mistakes	“When you start getting on a critical path in terms of delivering something, the project management structure takes over. And is designed to stop people embarrassing ministers, or doing something daft, or things going wrong. So the system does tend to take over.”
	Take on risks	“It's a way of being able to identify where the key risks are, tackle them and mitigate them, and actually get on and do what you want to do.”
	Incorporating and balancing stakeholder interests	“We do and then we try to accommodate the needs of all parties, whether it be [...]”
	To produce better policy	“I guess to produce policies that are – they are most likely to have the greatest, the best outcome – the greatest benefit with the least negative impact.”
	Meet bureaucratic demands	“I mean if they're really useful if someone said to me so say someone senior says to me Emily you need to think about the risks of this, I want to see something. That's the first place I'd go to the tools to use them because they're useful for that. But I think you don't necessarily automatically think to do them.”
	Benefiting the Department's	“[...] there's the department itself, of course, in terms of reputation.”

reputation	
Benefiting Government's reputation	"[...] and of course being a government department it's the overall government's reputation as well."
Covering your back	"Cynically, to cover peoples backs. People want to make sure that... I think especially with something like the project I am involved with now the risk of being judicially reviewed is very conscious in people's minds. If you are somebody who is quite keen, to get on within the Department and is quite ambitious, you don't want yourself to be mired in some policy that wasn't delivered or managed well so I think in terms of managing risk, I suppose it is that people will do it to make sure that they have covered all the bases so to speak and done the right things and got things checked and verified. So, yes, I would say covering backs really."
Tool to push individual agenda	"I think the water has become somewhere muddy where people want to use risk assessments for different things. I think some people have the perception that they want to give the impression that everything is fine, and therefore they want to minimise the presentation of that risk whereas other people want to draw people's attention to it, and deflect blame from themselves; "It's all very risky," and therefore they want to increase that risk. So, it's an interesting tension."
Increasing risk awareness	"I would say so, yes. I mean you can't always - as you say, you can't always take a no-risk solution. There are always going to be risks to whatever solution. But at least you try and identify them. In a perfect world you try and identify what those risks are so that at least you know when something goes wrong why and you've tried to put in countermeasures."
Facilitate proactive risk management	"Well, as I understand it it's to really try and identify when you're setting out to do something, all the things that could conceivably go wrong. And to try and firstly have some sort of strategies in place to prevent those things going wrong."
Prioritising limited resources	"I think this has got multiple answers this. I would say, from our point of view, it's going to be about prioritising limited resources."

Table 4.3.6.: Perceived effect of formal risk management

This table describes how participants perceived formal risk management. Perceptions are varied. Perceptions of the effect of formal risk management range from: improving risk management; to benefitting project management and an unnecessary bureaucratic burden. Of particular note is the perception that formal risk management is desirable as a way to make explicit and thus demonstrate risk management activity to superiors. This suggests some participants perceive that their superiors have a positive attitude towards risk management and expect to be gain personal benefit from being seen to manage risk.

Main code and sub-codes		Example
Main code	Sub-codes	
Perceived effect of formal risk management <i>Formal risk management is defined as with an explicit logic and evidence based, and following a repeatable method.</i>	Demonstrate risk management activity	“Probably the senior reporting officers, so the people who’re actually responsible ultimately in name for delivering [...] for him to know that we’ve seen the risks and can demonstrate that I think is really beneficial for him.”
	Help prioritise risks and work	“Actually I’ve just thought of a third and that’s where, if you’re sitting on a project board for someone else’s project, and if you haven’t got much time, it helps you to focus on the things you really ought to be focus- you know what do I need to be worried about?”
	Facilitate participatory risk management	“Yes. I find having a formal risk register has been very useful. It’s like I say, it encourages everybody within the team, regardless of where you are – in terms of subject area or in terms of the organisational structure, to comment and to flag things which wouldn’t I don’t think happen otherwise.”
	Unnecessary bureaucracy	“And I don’t actually think it [systematic approach] has made a fundamental difference to the way I approach looking at risks about my policy things anyway.”
	Prompt attention on risk and risk management	“I think it’s partly the discipline of actually thinking through the issues. So you do actually have to make time to sit and think about it. So that does prompt you to consider things in a slightly more structured way, rather than just carrying on and hoping for the best. Which is the other alternative, to a large extent. You just hope everything is going to be all right. And make it up as you go along if it doesn’t.”
	Facilitate proactive risk management	“Well...generally, spotting problems before they happen is the main one. And, I think making sure that you’re putting in processes to minimise and mitigate risks from the start, rather than having to do it later. So, you’re generally going to save yourself money and time by planning it properly in the first place.”
	Help keep track of risks	“It’s important because you can register your risks on there. You can keep them up to date and you can actually keep track on exactly where you are and what is going to be the biggest problem facing you as you go through the decisions on this policy area.”
	Keeping aware of project plan	“It keeps you focussed; it keeps you aware of the trajectory you’re on, and what you need to be doing now to prepare for the upcoming processes. And it keeps you thinking about all the processes within the cycle at any given time so you’re not just concentrating, as might happen otherwise, purely on delivery without thinking ahead to how you’re actually going to be monitoring progress etc.”
	Formally assign risk owners	“You also formally assign owners to them, so there’s some sense of who is in control of this.”
	Helps identify risks	“But I think the system now with the range of impact assessments that go into this policy cycle, I think that there’s a very, very good chance of the right risks being identified and assessed correctly. If ministers don’t want to go for a different policy, by all means do so, but at least they’re aware of the risks.”

Appendix J: Complete coding hierarchy

Table J1: Complete coding hierarchy

Chapters	Case study	Social process	Cultural factor (s)	Supporting open codes	Table
4.1., 5.1.	Power Utility (Case study one)	Deference to expertise ^a	Shared experience; Respect for experience (a high value attributed to direct experience)	use of experience throughout the hierarchy	4.1.1.
				Colleagues' experience; Individual experience	4.1.2.
				High time pressure; Beyond experience; Conflict between rules and expertise; Risk is predictable and well known; Complex risk decision; Risk is not covered by codified rules; Multiple risk categories	4.1.3.
				Risk management complexity necessitates judgement	4.1.5.
				Respect for experience; Importance of shared experience for communication	4.1.6.
				Lack of coordination and communication	4.1.7.
				4.3., 4.4., 5.2.	Government Department (Case study two – knowledge transfer)
Culture of collaboration; Risk registers and team communication	4.2.2.				
Lack of knowledge retention; Lack of financial resources; Lack of time; Lack of formal knowledge sharing	4.2.3.				
5.3.	Government Department (Case study two – shared knowledge)	Predicting the wider impact of individual risk management actions (representation ^d)	Common understanding of the purpose and function of risk management	Formal risk management practice; Informal risk management practice; Not driven by risk at all; Going through the motions	4.3.1.
				Informal consultation and collaboration; Leadership expectations; Codified processes; Experience; Stakeholders; Not formal guidance; Training; Normative; Individual pragmatic legitimacy	4.3.3.
				Beneficiary of risk management; Purpose of risk management	4.3.5.
				Perceived effect of formal risk management	4.3.6.
				Avoiding EU infractions; Avoiding negative stakeholder response; Risk to the Department's reputation; Managing limited resources; Risk to UK Gov or minister reputation; Balancing stakeholder interests	4.3.7.

Appendix K: Biographical information on interviewees in case study one

Interviewee (not actual name)	Policy Area	Role	Grade
1	Nitrates	Policy Adviser	Grade 7/Team Manager
2	Nitrates	Business manager	Executive Officer
3	Waste -producer responsibility	Policy Adviser	Grade 7/Team Manager
4	Waste -producer responsibility	Policy Adviser	Higher Executive Officer
5	Waste -producer responsibility	Policy Adviser	Higher Executive Officer
6	Waste -producer responsibility	Policy Adviser	Higher Executive Officer
7	Rural	Policy Adviser	Grade 7/Team Manager
8	Rural	Policy Adviser	Senior Executive Officer
9	Food - country of origin	Policy Adviser	Grade 7/Team Manager
10	Food - country of origin	Policy Adviser	Senior Executive Officer
11	Food - country of origin	Policy Adviser	Higher Executive Officer
12	Food - country of origin	Policy Adviser	Higher Executive Officer
13	Carbon budgets	Policy Adviser	Grade 7/Team Manager
14	Carbon budgets	Policy Adviser	Higher Executive Officer
15	Carbon budgets	Policy Adviser	Higher Executive Officer
16	Landscape and outdoor recreation	Policy Adviser	Grade 7/Team Manager
17	Landscape and outdoor recreation	Policy Adviser	Higher Executive Officer
18	Landscape and outdoor recreation	Policy Adviser	Higher Executive Officer
19	International protected areas	Policy Adviser	Grade 7/Team Manager
20	International protected areas	Policy Adviser	Higher Executive Officer
21	Animal welfare	Policy Adviser	Grade 7/Team Manager
22	Animal welfare	Policy Adviser	Senior Executive Officer