Judgements during Information Seeking: Policy and Research Workers' Assessments of Enough Information

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Certificate of authorship and originality

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of the requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in this thesis.

Signed

Date

To

John and Tessa

Marjorie and Bob

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Abstract

This thesis examines how people determine they have enough information, a fundamental but perplexing question for human information behaviour researchers. Informed by theories of human judgement and decision making, the thesis investigates the ways in which judgements of enough information are made and the subtleties that shape this critical judgement.

The empirical work that underpinned the thesis was an exploratory study conducted from an interpretive orientation and using the case study approach. The study examined multiple cases of judgements of enough information made while seeking and using information in the workplace. Semi-structured interviews (33) were conducted with public sector policy and research workers in Australia. Two interviews were carried out, the first with individual participants to explore the nature of the contexts in which they worked and the second, a paired interview with two participants to focus on how they assessed they had enough information. Interviews were taped and transcribed and inductive data analysis carried out.

Principal findings included the importance of task in shaping judgements of enough information through an iterative and fluid process. Throughout the process the nature of what constituted enough information changed. Factors in the information use environment of the policy and research workers that shaped their judgements of enough information included the views of colleagues, supervisors and stakeholders, organisational decision making processes and organisational attitudes towards uncertainty. The collaborative information seeking and use of the policy and research workers resulted in collaborative judgements of enough information.

The research makes three contributions to the field of human information behaviour research. Firstly findings provide new insights into judgements of enough information made by the policy and research workers, illuminating the judgement of enough information as a process and refining concepts critical to understanding judgements made while seeking and using information. Secondly the study provides a rich description of policy and research workers, a professional group not previously studied in relation to enough information, and their role in the public policy process. Thirdly

concern about the limitations of behavioural decision theory to fully explain judgements of enough information led to consideration of naturalistic decision making, a recent development in decision theory. Naturalistic decision making affords a different perspective on human judgement and decision making. As a conceptual framework within which to develop more nuanced understandings of judgements and decision making during information seeking, naturalistic decision making has much to offer human information behaviour researchers.

Chapter 1

Enough in a world of abundant information

Determining what constitutes enough information is a major challenge for people seeking and using information to complete work tasks in an environment characterised by an abundance of information. In the information economy, activities related to seeking and using information consume substantial amounts of time in the workplace. Industry figures reveal that white-collar professionals spend an estimated 20-35% of their time seeking information (Koenig) while other research reports an estimated $US31 billion is spent on time searching online resources (FIND/SVP, 2004; Overseas Development Institute, 2004). Each year, the volumes of information grow (Gantz, et al., 2008; Lyman and Varian, 2003).

As the amount of available information grows, so too does expenditure on information and communications technologies (ICTs) with the promise of helping to more effectively manage information. Significant investments are made in systems to help workers source, retrieve, share and use information. However research findings suggest that these investments in ICTs often do not provide the anticipated returns on investment (Sawyer and Eschenfelder, 2002, pp. 440-2) and organisations continue to face challenges in managing information (Accenture, 2007; Allen and Wilson, 2003, p. 32; Eppler and Mengis, 2004, p. 331; Thomas, 2006).

At the core of the issues pertaining to how people respond to the abundance of information with which they work is the feeling that ‘no matter how much [information] we get, we feel we need more, and of better quality and focus’ (Kirsh, 2000, p. 22) even though ‘more information is not better information’ (Leadbeater, 2000, p. 10). Workers gather information that is not used (Feldman and March, 1981, p. 174; Solomon, 1997b, p. 1136; Wilson, 1995, p. 46), seemingly gathering more than enough information to meet their apparent information need (Feldman and March, 1981). Workers generally do not see themselves as ‘expert searchers’ (Waddington, 1997) and become concerned ‘about their ability to effectively navigate through their information environment’

(Allen and Wilson, 2003, p. 40). These conditions may combine to increase anxiety (Wurman, 1989) with the end result 'a complete failure to meet task goals' (Case, 2002, p. 100). Workers find that recognising when to end their information seeking activities is a difficult assessment to make (Algon, 1999, p. 163). However at some point, they do stop seeking more information. Whereas once workers may have felt confident they could find all that was needed from a known set of resources, in the networked environment in which many people carry out their tasks, this is no longer the case.

Researchers in the field of human information behaviour know comparatively little about how assessments of enough information are made and the question of how people establish that they have gathered enough information for task completion continues to perplex scholars in this field. Relevance judgements have been the focus of sustained investigation since the 1950s (Anderson, 2003, p. 3). However another judgement made while seeking and using information - the judgement of enough information - remains under-researched. In this world of abundant information a deeper understanding of how people make the judgement that they have enough information fills a gap in the field of human information behaviour research and provides useful professional knowledge for information management professionals and designers of ICT systems.

The overall aim of this thesis is to develop a deeper understanding of how, in an information-rich environment, workers assess that they have enough information to complete the task at hand. The research also explores the influences – individual, work-related and environmental – that shape the ways in which workers make assessments of enough information with a particular focus on how that influencing takes effect.

1.1 Origins of the research

In setting out to explore judgements of enough information during work-based information seeking and use, the thesis turns the spotlight away from the use of information in decision making, an area that has been extensively researched in the field of human information behaviour. The thesis focus is clearly on the judgements and decisions made during information seeking and use. Nonetheless the thesis draws on the

theories of human judgement and decision making to extend the field's understanding of how workers manage their way through large volumes of information.

Human information behaviour broadly and information seeking behaviour more specifically have been mapped as a series of stages or features in a number of different models. Kuhlthau's (2004a) model of the information search process, for example, depicts that process as a series of stages commencing with task initiation and concluding with the presentation of the completed product. Wilson's (1999, p. 257) model of information behaviour opens the lens to portray a broader view of human information behaviour and seeks to capture the role of contextual factors and personal attributes in shaping that behaviour. Although often depicted as a process or a set of staged activities, researchers acknowledge that information seeking and use is not experienced as an orderly, single-pass process (Foster, 2004, p. 232; Kuhlthau, 2004a, p. 79; Wilson, 1999, p. 267). Nonetheless models such as those of Kuhlthau and Wilson are necessarily portrayed in two dimensions and present the experience of seeking and using information in a series of boxes or concentric circles.

An intriguing question when looking at models of this kind is, what it is that moves people from one stage to another? Putting it another way, what is going on 'between the boxes or the lines' of the models? One such move relates to the ways in which people determine they have enough information and move from seeking information to task completion. The decision to stop or continue seeking information is one of the choices faced during information seeking (Kuhlthau, 2004a, p. 100). However much remains unclear about how this choice is made and the nature of its relationship with the concept of enough information. This thesis brings together an interest in work-based information seeking and use with the puzzling question of how people assess they have enough information when seeking and using information for task completion.

1.2 Rationale for the thesis

The field of human information behaviour research has not yet teased out the subtleties that shape that 'deceptively simple question' (Kuhlthau, 2004a, p. 199) of what is enough. While Harter and Hert's call (1997, p. 15) for research into why people stop

looking for information has been answered for *some* groups undertaking *some* information seeking activities, there is still much the field needs to know about the nature of the phenomenon of enough information. In particular the *ways* in which information seekers make judgements of enough information and the *ways in which contextual factors* influence those judgements remain relatively unexplored.

The research presented in this thesis sought to address the gaps in the field's understanding of the phenomenon of enough information, and in particular, sought to understand how the judgement of enough information was made when seeking and using information in the workplace. This area has been identified as an area of need with Stefl-Mabry (2005, p. 1425) calling for research into the ways in which professionals make judgements and decisions while seeking and using information. Acknowledging that human information behaviour takes place in and is shaped by contextual factors, the thesis also sought to clarify the nature of the relationships between the information seeker, the context in which information is sought and used and judgements of enough information made.

The thesis is framed within a theoretical perspective that situates human information behaviour in context. A 'distinct, unifying theoretical body' of knowledge on human information behaviour has emerged in recent years (Pettigrew, et al., 2001, p. 67) and theoretical and empirical research from this field was the core body of literature that informed the thesis. Since the 1970s investigations into the concepts of enough information and stopping behaviour run like a thin thread through this body of research.

The phenomenon of enough information has featured in only a small number of human information behaviour studies. Research to date has investigated the question of *what is enough?* as one part of larger studies into the information seeking behaviour of particular groups of people. Zach for example (2002) investigated enough information as one aspect of a study into the information seeking behaviour of arts administrators. Other researchers have investigated enough information in tandem with the related phenomenon of stopping behaviour, that is user determination to end information seeking activities. As with the phenomenon of enough information, stopping behaviour has been relatively neglected by human information behaviour researchers with an

apparent assumption that, because there is a beginning to information seeking, there must an end to it as well. For example, Meho and Tibbo (2003) revisited Ellis' (1989) information seeking behaviour model, collapsing the model to group Ellis' original features (starting, chaining, browsing, differentiating, monitoring, extracting, verifying and ending) into four inter-related stages (searching, accessing, processing and ending). However, the final stage of ending is not explicated in the same way as the other three stages, with Meho and Tibbo (2003, p. 585) simply assuming an end stage, on the basis that if a research project that initiated information seeking has a beginning, it must also have an end.

Several studies that have investigated enough information and stopping behaviour in tandem have been framed within the theoretical framework of human judgement and decision making, in particular, the theory of bounded rationality and satisficing. Agosto (2001) for example set out to discover whether the theory of bounded rationality and satisficing behaviour was evident in decisions made while surfing the web.

However researchers have not always distinguished between the two phenomena of enough information and stopping behaviour and at times appear to treat them as identical. As a result, research into the latter phenomenon of stopping behaviour was also considered in the thesis. Other researchers investigating enough information chose not to position decision theory as central to their research. Parker (2006) for example investigated postgraduate students' experiences of enough as they completed coursework assignments, positioning enough as an integral and rich component of the assignment experience rather than simply a signal to end information seeking.

Given the thesis focus on enough information and the perceived lack of clarity about the relationship between enough information and stopping behaviour, an immediate challenge was illuminating the nature of the phenomenon of enough information. The recognition that people make decisions at various points during the information seeking process (Kuhlthau, 2004a, p. 100) suggested that the field of human judgment and decision making would offer insights into enough information and the relationships between enough information and stopping behaviour. The field of human judgement and decision making was therefore covered in the literature review and as a result of

engagement with this literature, the phenomenon of enough information is positioned in the thesis as a judgement that precedes and feeds into the decision to stop seeking information.

The review of the human judgement and decision making literature also opened up a broader perspective on the two phenomena of enough information and stopping behaviour. Instead of focusing on stopping behaviour or rules operating solely at the end of the process of seeking and using information, the study took a more holistic perspective, acknowledging the choices made throughout the process. These choices shape options available to the information seeker later in the information seeking process so it is important to understand the concept of enough information throughout the multiple stages of judgement and decision making while seeking and using information.

Several common threads have emerged from previous empirical studies, such as redundancy of information acting as a cue to suggest enough information has been gathered. The task itself is also important in shaping work-based information seeking and use although it is less clear how task interacts with and influences the judgement of enough information. Some intriguing differences are also apparent in recent research findings, such as findings that point to a creative dimension to enough information and search closure, reported in some but not all of the studies. While the thesis builds on this earlier work, there is still much that researchers in the field of human information behaviour need to know about the ways in which contextual factors influence the phenomenon of enough information in work-based information seeking and use.

People's decisions about having enough when they are able to make sense of the information available (Kuhlthau, 2004a, p. 199) depend on the context in which they are working. Since the emergence of a more user-focused approach to human information behaviour research during the 1980s, researchers' understanding of the many influences on information behaviour has grown (Case, 2002). Choices are influenced by a range of factors such as task, work role, organisational culture or external environment (Wilson, 1999). Differences in individual experience, skills and personality are other important influences on information behaviour (Pettigrew, et al., 2001). Investigating the

phenomenon of enough information within the framework of information seeking and use in context made it necessary to consider both the individual's assessment of enough information and the contextual factors which may shape those assessments.

In particular the thesis paid attention to the processes through which contextual cues and signals shape assessments of enough information. With this attention to process, the thesis illuminates a little understood aspect of the judgement of enough information. The exploratory nature of the research and the need to accommodate the interaction between individual and context informed the methodological orientation of the research and the design of the study.

1.3 Significance of the research

The significance of the study derives both from its empirical findings and from its contribution to the theoretical development of the field of human information behaviour. In investigating an under-researched aspect of the field of human information seeking behaviour, the study builds on empirical findings on enough information and stopping behaviour. By exploring how different factors come into play during ongoing assessments of enough information, the study expands the field's knowledge of how people navigate the complex multi-stage process of judging enough information throughout the process of seeking and using information.

Study participants were public sector policy and research workers. These workers have been seldom studied in human information behaviour research and findings brought new knowledge of their information seeking behaviour to the field. As a group, policy and research workers are also under-researched in the field of public policy (Colebatch, 2002, p. 121-2) although they are becoming increasingly influential (Gualtieri, 1999, p. 27). As long ago as 1989 Feldman (1989, p. 147) called for further investigation into the ways in which work context influenced the processes through which information was sought and used in the development of public policy. There is now renewed interest in how policy making is informed by information and research findings (Overseas Development Institute, 2004; Stone, et al., 2001, p. 1; United Kingdom. Cabinet Office, 2005). Policy and research workers are the people who seek and use information and

research as an aid to the making of public policy. The study findings have illuminated some aspects of how information and research is used in policy making.

Unlike previous research in the area, the focus of this study was squarely on the phenomenon of enough information on its own. The phenomenon was not investigated as part of a larger research interest, for example, in the information seeking and use behaviour of a particular group. Instead the judgement of enough information was investigated as a single phenomenon, albeit one embedded in information seeking and use behaviour, which was in turn embedded in work tasks. This approach provided a unique perspective on the judgement of enough information.

Arising from this perspective on the phenomenon was the careful examination of the full range of human judgement and decision making theory. Researchers in the field of human information behaviour have drawn on decision making theory to understand the relationships between information behaviour and decision making. However those researchers using decision theory to understand enough information and stopping behaviour have found it inadequate in fully explaining these phenomena. The limitations of the dominant decision making theories was also apparent in this study and led to the consideration of the field of naturalistic decision making as a framework for analysing judgements and decisions made while seeking and using information. By expanding the research repertoire of the field of human information behaviour, the study has made a significant contribution to the theoretical development of the field of human information behaviour research. The thesis has also contributed to a clearer understanding of the relationships between judgements and decisions made while seeking and using information.

Study findings potentially have implications for the practice of information management, particularly in the workplace. In organisations struggling under the weight of too much information, an increased understanding of the ways in which information seekers in the workplace assess the fulfilment of their information needs may contribute to more informed decisions on investments in managing information. There are also implications for the ways in which services are configured to meet information needs in

the workplace and for the evolving role of information management professionals in the workplace.

Study findings are also of value for the education of information management professionals. The use of information in decision making in organisations, especially by managers, has rightly received substantial attention in teaching programs for the profession. However, as information becomes increasingly abundant and easier to access, the skills needed for efficient and effective information seeking and use have become more important (Houghton and Sheehan, 2000, p. 11) at all levels of the organisation. Findings from the thesis suggest that workers other than the managerial decision makers seek and use information in organisations and in some areas of work, these other workers may be highly influential players in the decision making process. As an important element of the landscape of work-based information behaviour, the information seeking and use behaviour of workers other than managers is deserving of attention.

1.4 Research aims

The overall aim of the thesis was to develop a deeper understanding of how, in an information-rich environment, workers judged that they had enough information to complete the task at hand. The gaps in the literature on assessments of enough information together with the lack of clarity about the relationship between enough information and stopping behaviour gave rise to and shaped the empirical research that underpinned the thesis. From the overall aim, two research questions were developed to scope the empirical study:

Research Question 1

What do workers understand to be enough information? How do they determine that they have enough information to complete work tasks?

Research Question 2

What influences shape workers' assessments of enough information? How do these influences shape assessments of enough information?

1.4.1 Terminology

In a number of the studies analysed in the literature review the concept of enough has been left undefined. In other studies the phenomenon has been treated in close connection to the construct of stopping rules; for example both Zach (2002) and Prabha et al (2007) appear to position enough information as synonymous with stopping rules. In the thesis *enough information* is considered a *judgement* that precedes and feeds into the decision to stop seeking information.

The terms *assessment* and *judgement* of enough information are used synonymously in the thesis. However when citing other work, the phenomenon of enough information is described and used in keeping with the intent of the authors.

Stopping behaviour in human information behaviour studies is a term closely associated with information retrieval research. However, for reasons of clarity and consistency, the term is used throughout the thesis to identify people's decision to end either their information retrieval activities or more broadly their information seeking and use activities. Other key terms and definitions are listed in the Glossary in *Appendix One*.

1.5 Thesis overview

The thesis is presented in seven chapters. The next chapter reviews human information behaviour research on enough information and stopping behaviour. The chapter also considers human information behaviour research that addresses the issue of context as a framework for understanding influences on judgements of enough information, and concludes by revisiting the empirical findings on enough information and stopping behaviour through the lens of context.

In Chapter 3 the methodological orientation of the empirical study into judgements of enough information is described and justified. Chapter 4 describes the research design for the study. Chapter 5 provides a detailed description of the public sector settings in which study participants made their judgements of enough information. This chapter contextualises the research findings that are presented in Chapter 6. Chapter 7 discusses

the implications of study findings for the field of human information behaviour `research, considers the limitations of the study and provides suggestions for further research.

Chapter 2

Enough information: Review of the theoretical and empirical literature

This thesis aims to develop a deeper understanding of the phenomenon of enough information as it is experienced by people seeking and using information to complete work tasks. The research is situated within a conceptual framework that positions human information behaviour within context. Since the expansion in the field of interest, the process of seeking and using information has received much research attention. The assessment of enough information however remains relatively neglected.

Reacting to concerns that human information behaviour research appeared divorced from professional practice, Dervin and Nilan (1986, p. 12) called for a major shift in the field's research parameters. Building on this shift to a user-centred approach, human information behaviour researchers have subsequently developed a range of perspectives that situate the individual information seeker in a social or organisational setting (Pettigrew, et al., 2001). This expanded perspective has increased researchers' understanding of the many influences on human information behaviour, both in everyday life and in the workplace and has contributed to the development and use of a multitude of theories, models and perspectives (Dervin, 2003).

One approach to imposing order on the complexity and diversity of the field of human information behaviour research is to model the different types of human information activity in a series of nested and inter-dependent relationships (Wilson, 1999, p. 263). At the broadest level, information behaviour encompasses 'the totality of human behaviour in relation to sources and channels of information, including both active and passive information seeking and use' (Wilson, 2000, p. 49). One element of human information behaviour is information seeking behaviour.

In Wilson's nested model information seeking behaviour is distinguished from information use, a distinction supported by Pettigrew et al (2001, p. 44) and Taylor

(1991, p. 221). While the field of human information behaviour has tended to study the two activities of information seeking and information use as distinct and separate, they are recognised as two inter-related facets of an holistic experience and are treated as such in this thesis. This position was taken primarily because in the workplace, the setting of interest for the thesis, people rarely distinguish information seeking activities from the work tasks in which they are embedded (Bystrom and Jarvelin, 1995, p. 192; Solomon, 1997b, p. 292; Zach, 2002, p. 195).

The phenomenon of interest for this thesis, the judgement of enough information, is embedded in the process of seeking and using information. While information seeking may not always be purposive (Bates, 2002, p. 4) information seeking and use in the workplace is purposive in that it is triggered by and embedded in work tasks. For this reason, the focus of the thesis was on assessments of enough information when seeking and using information to complete a work task.

The literature review provides an overview of the human information behaviour research into the phenomenon of enough information. Only a small group of studies has investigated the phenomenon. In several of these studies researchers have addressed the phenomenon of enough information independently of the related phenomenon of stopping behaviour (e.g. Parker, 2006). In other studies researchers have investigated the phenomenon of stopping behaviour, that is, user determination to terminate a search for information (e.g. Morehead and Rouse, 1982), and in so doing, have provided clues about assessments of enough information.

In still other studies researchers have conceptualised the phenomenon of enough information as intertwined with the concept of stopping behaviour (e.g. Zach, 2002) and so have investigated the two phenomena in parallel. Several of these studies into enough information together with stopping behaviour have been informed by decision theory, drawing on constructs such as satisficing and stop rules to understand this aspect of human information behaviour. Because of the close links in the literature between enough information and stopping behaviour, research that deals with enough information when associated with stopping behaviour has been included in the review.

While the field of human information behaviour is the primary field of research that informed the thesis, theories and research findings from the field of human judgement and decision making proved useful in teasing out important facets of the concept of enough information and its relationship to stopping behaviour. Theoretical research into judgement and decision making can be traced back to the 1940s (Harrison, 1999, p. 9). The literature is voluminous and, for the novice researcher, unwieldy, with its multiple and parallel lines of inquiry drawing in particular on the disciplines of economics and psychology. The thesis drew on only major strands of research and scholars of the field of decision theory to inform the conceptualisations of enough information and stopping behaviour that evolved during the study.

The focus of the thesis was on judgements of enough information during work-based information seeking and use. However insights into the phenomenon of enough information have emerged from studies in settings other than the workplace. For this reason the scope of the literature review was broadened to include research findings in these other settings, with studies selected for inclusion in the review on the basis of the insights offered into the concept of enough information. As well studies with both a narrower information retrieval focus and a broader information behaviour focus (Wilson, 1999, p. 263) were included in the literature review, selected on the basis of the insights they offered.

The chapter addresses the literature in five sections. The chapter begins with a review of empirical findings and theoretical work on enough information examining the core body of research into enough information and stopping behaviour:

- *Section 2.1: Assessments of enough information* reviews research findings on the phenomenon of enough information
- *Section 2.2: Assessments of enough information informed by decision theory* reviews research findings on enough information and/or stopping behaviour informed by decision theory
    - optimal decision theory
    - behavioural decision theory

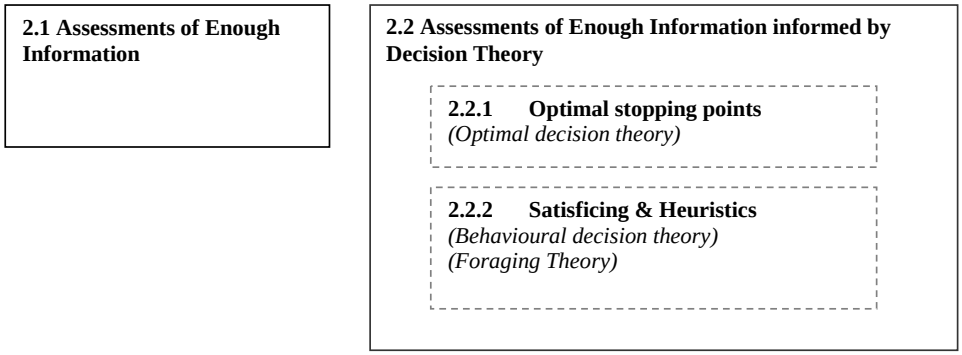
- *Section 2.3: Enough information and stopping behaviour* provides a summary of the empirical findings on enough information and stopping behaviour

The chapter goes on to revisit the empirical findings on enough information and stopping behaviour through the lens of context to illuminate the ways in which different influences shape assessments of enough information:

- *Section 2.4: Enough information in context* begins with a discussion of the core concept of context in human information behaviour research and continues with a consideration of the relationships between context and information seeker and establishes how the concept of context is treated in this thesis.
- *Section 2.5: Enough information through the lens of context* then returns to the empirical findings on enough information and stopping behaviour, examining these findings through the lens of context to illuminate the ways in which different contextual factors shape assessments of enough information.

As an orientation aid to the literature reviewed in this section, *Figure 2.1* provides an overview of the relationships between the key studies on enough information reviewed in this section in the light of their use of decision theory.

Figure 2.1 Key studies on enough information and stopping behaviour



2.1 Assessments of enough information

Although the assessment of enough information has been described in the literature as a choice confronting those seeking and using information (Kuhlthau, 2004a, p. 195, p. 199), a number of studies into the phenomenon have been conducted without explicit reference to judgement and decision making theory.

From several longitudinal studies into the information seeking behaviour of both workers and students, Kuhlthau concluded that four factors, 'task, interest, information available and time', all played a part in decisions to end information seeking activity (Kuhlthau, 2004a, p. 101). Each factor helped the information seeker to 'to form a focus' (p. 101) during search closure although the relative importance of each factor may differ from time to time. Kuhlthau concluded that the assessment of enough information was closely related to two of these four factors: task and the amount of information available. People determined that they had enough when they recognised that they could accomplish the task at hand or they were able to make sense of the information available. However Kuhlthau's findings are less revealing of *how* people drew on different cues and signals that helped them recognise when they had enough information.

The relationship between information seeking and the associated task has been investigated in only a limited number of empirical studies (Vakkari, 1999, p. 822) although interest in the relationship between task and information seeking is increasing (Bystrom and Hansen, 2005, p. 1050). A task comprises a series of 'linked concrete or cognitive activities performed by people (or machines)' (Bystrom, 2007) elements in a 'complex context that is impossible to control in detail' (Bystrom and Hansen, 2005, p. 1052).

A relationship between task and enough information has been reported in studies into the information behaviour of lawyers, academics and students and in the workplace, assessments of enough information were closely associated with the tasks that triggered the seeking of information. The formulation of task is critical both to task performance and to determining what information is required for task completion (Bystrom and Jarvelin, 1995, p. 194). Bystrom and Hansen (2005) subsequently reported that there is

a relationship between the amount of information gathered and 'task requirements' (p. 1055) arguing that information seeking has been successful when 'enough relevant information' (p. 1055) has been gathered to meet task requirements. However Bystrom and Hansen are silent on the matter of *how* the information seeker determines what is enough information. Vakkari's work on tasks has also provided clues to the role of tasks in assessments of enough information. Part of task formulation is deciding on the 'central elements (concepts and their relations) of the task (Vakkari, 1999, p. 826) leading to the forming of an understanding of the nature of the problem and the task and an evolving picture of the information needed for task completion. Vakkari's conclusions were echoed by Kuhlthau in her observation that assessing enough information requires 'determining what one needs to know and […] formulating a perspective on which to build' (Kuhlthau, 2004a, p. 199). An investigation into the nature of tasks carried out by workers in project teams sheds further light on the role of task in search closure. In her study Algon reported an intuitive dimension to knowing when to stop seeking information (Algon, 1999, p. 163) but noted that participants in her research found this decision both 'difficult and discomforting'.

The aim of the research reported by these scholars was to investigate how human information behaviour is shaped by work tasks. Because of this broad aim the research findings here make only tangential reference to the relationship between enough information and work tasks and shed only a little light on the role of work tasks in assessments of enough information.

Several other studies have also reported findings that enough information was associated in some way with work tasks. Two of Kuhlthau's studies investigated assessments of enough information as part of a larger study into information seeking in the workplace (Kuhlthau, 1999b; Kuhlthau and Tama, 2001). The influence of the complexity of tasks in work-based information seeking was revealed in Kuhlthau and Tama's (2001, p. 30) findings that for lawyers, it was difficult to specify exactly what information was needed for their tasks. Despite this challenge, the lawyers who participated in Kuhlthau and Tama's workplace study reported 'a definite sense of closure' (2001, pp. 33-4) in the form of a puzzle looking completed. 'Filling in a slot' (Kuhlthau, 2004a, p. 178) and being able to 'answer the questions they felt they would

be asked' (Kuhlthau, 2004a, p. 181) in the courtroom were other cues that signalled to the lawyers that they had gathered enough information. The findings reported above provide evidence of a relationship between work tasks and enough information but the nature of that relationship remains unclear.

The experience of researchers and students in academic settings revealed slightly different focus when assessing enough information and stopping information seeking activity. A sense of 'knowing enough' surfaced as a 'core process' in the consolidation category of Foster's model of information seeking (2004, p. 232) developed from empirical findings of a study into the information seeking behaviour of academic researchers. The consolidation category was associated with 'judging and integrating the work in progress and deciding whether further information seeking is necessary' (Foster, 2004, p. 234) . For these researchers enough information had more to do with making sense and integrating new information than completing puzzles and filling in slots. The academic researchers studied by Foster also drew on dialogue with colleagues as one aid in the experience of incorporation during the consolidation phase of their information seeking.

Similar findings on experiencing enough information as making sense emerged from two studies into the information behaviour of postgraduate students. Understanding and engagement with their assignments, one category of Parker's (2006, pp. 129-30) phenomenographic analysis of postgraduate students' experiences of enough, also revealed this dimension of enough information. The students who participated in Parker's study needed to make sense of the content with which they were working, as they developed a deeper understanding of their topic. Parker's findings support those of Cole (1997, p. 64). Cole described the efforts of a Ph.D. student to integrate new information into existing knowledge structures during the closing stage of information seeking, as he contextualised the new information and set it within his pre-existing understanding of thesis topic.

Reporting experiences similar to those of the lawyers studied by Kuhlthau and Tama, two studies have found that students also used questions, albeit in these cases, assignment questions, as cues in their judgements of enough information. Both Limberg

and Parker found that students also used the questions posed in their assignment topics as criteria against which to assess enough information. Limberg (1999) reported the high school students she studied felt in part that they had enough when they could 'answer their research question', a finding similar to that of Parker (2006, p. 120, p. 124) who described two experiences of enough as 'control and getting done' and optimal production. In both of these categories, Parker reported an emphasis on using the structure of the assignment as a cue to assessing enough.

Time was a common theme in findings from several of the studies reviewed although time was more likely to be a cue that information seeking should end than a criterion for assessing enough information. For students, time was evident in the need to meet a deadline (Kuhlthau, 2004a, p. 197), and in the experience of having 'no time or energy to go through more' (Limberg, 1999). Time was also a constraint for the interdisciplinary academic researchers studied by Foster (2004, p. 232), even though these workers appeared to have more control over their research tasks and the associated deadlines than did students, for example. Time was less apparent as a cue for enough information in the workplace studies carried out by Kuhlthau, although a sense of time running out did surface in Solomon's (1997a, p. 1135) longitudinal investigation into information seeking and use during planning activities in the workplace.

Time was apparent in a slightly different way in Parker's findings on the role of time in postgraduate students' assessments of enough information. Parker reported that time acting as a constraint was strongly evident when participants spoke of enough in the sense of getting the assignment done. However, as the experience of enough moved towards higher level categories, time became less important, until emerging at the generative and creative level in a 'different and whimsical 'if only' sense' (Parker, 2006, p. 136). Parker argued that for these participants time, while being a constraint at some points, also had a strong motivational effect, an effect not apparent for people seeking and using information in the workplace as in the studies of Bystrom (1995) and Kuhlthau and Tama (2001).

As well as task, the integration of new information and time other factors were associated with the assessment of enough information and the closing stages of

information seeking. ‘Diminishing relevance’ in the material being found was one signal that the process of seeking information was coming to a close and enough information had been gathered (Kuhlthau, 2004a, p. 40). Described by one student as ‘going off the topic’, this experience has similarities with the experience of the lawyers studied by Kuhlthau and Tama (2001) who were also very focused on their topic or case. A sense of increased redundancy in the information found was another important signal (Kuhlthau, 2004a, p. 199). The effort put into in gathering and working with the information was another factor, with students reporting feelings of having put in ‘sufficient effort’ or of ‘having enough to present’ (Kuhlthau, 2004a, p. 83) being triggers for stopping the search for more information.

Affective responses accompanied the cognitive signals that enough information had been gathered. Redundancy of information created feelings of increasing confidence (Kuhlthau, 2004a, p. 97). This confidence was associated with increasing certainty that enough information had been gathered to address the most important issues in the task (Kuhlthau, 2004a, p. 199; Wilson, et al., 2002, p. 712) and so acted as a signal for search closure. The affective dimension also showed up in the lawyers’ confidence that enough information was in hand to make a case or an argument, and in a student’s feeling of pleasure that she ‘had enough to capture a sense of what it means to be an information professional’ (Parker and Berryman, 2007, p. 92). Also apparent from the empirical findings was the iterative nature of assessments of enough information with people making assessments of enough throughout the process of seeking and using information (Foster, 2004).

For the students studied by Kuhlthau, Limberg and Parker a further important factor in determining enough information was a kind of personal investment in the quality of product being completed, that is, their written assignment papers. Kuhlthau reported students had ‘personal standards that they consistently used to determine closure’ (2004a, p. 83), a finding supported by the phenomenographic work of both Limberg and Parker (Limberg, 1999; Parker, 2006). In addition to the time constraints reported earlier, Limberg conceptualised the enough judgments of her subjects in terms of a personal investment in the quality of the assignment being completed. These students had enough information when they felt they could ‘analyse and discuss their topic in a

comprehensive, in-depth manner' (1999, para. 74). Parker also observed this sense of personal investment in the postgraduate students who participated in her study. Parker categorised the students' experiences of enough in five different ways, ranging from the very practical sense of control over their assignments and getting them done, described earlier in this section, to the experience of enough as a 'generative driver of the [assignment] content vision' and a motivator towards discovery and creativity. Although the experiences of the lawyers studied by Kuhlthau and Tama (2001, p. 34) did not directly parallel those of the postgraduate students in Parker's study, the lawyers did acknowledge a creative dimension to process of putting together the arguments for their court cases.

Summary

The studies reviewed in this section all provided insights into a range of cues and signals that indicated to information seekers that they had gathered enough information as they moved through their information seeking. In summary, both cognitive and affective cues were reported in these studies as signalling enough information or search closure; these cues were:

- a sense of solving the puzzle that was the task or assignment
- dialogue with colleagues
- integrating new information into existing knowledge structures
- time, as a constraint and as a motivator
- diminishing relevance in the information found
- redundancy of information
- amount of effort put in to assignment
- feelings of confidence and increasing certainty
- a personal investment in the quality of the assignment.

However, as Parker (2006, p. 22) noted, the phenomenon of enough information has not been the sole focus of major research efforts despite its significance to the field. The findings on enough information reviewed in this section have all arisen from broader investigations into information seeking behaviour in the workplace (Foster, 2004; Kuhlthau and Tama, 2001) or into information seeking and use in a learning context

(Limberg, 1999; Parker, 2006). The findings provide clues as to *what* is important in the assessment of enough information. However less evident in these study findings is an understanding of the processes through which people make their assessments of enough information. It remains far from clear *how* ongoing assessments of enough information are made.

2.2 Assessments of enough information informed by decision theory

A second and related line of inquiry has investigated enough information and stopping behaviour through the lens of the theories of human judgement and decision making. Early interest was in stopping behaviour, defined as user termination of a search for information. Decision theory continued to be influential as later researchers drew on the theory of bounded rationality and constructs such as satisficing and heuristics to understand how people assessed they had enough information and decided to bring their information seeking to a close. The focus of this thesis was on enough information. However research findings on both enough information and stopping behaviour have been included in the literature review because in a number of studies researchers have investigated enough information and stopping behaviour as a single phenomenon.

There is as yet no unifying body of theory for human judgement and decision making (Goldstein and Hogarth, 1997, p. 3), given its recent genesis and its complexity (Harrison, 1999, p. 10) and research findings remain ambiguous and sometimes contradictory (Stefl-Mabry, 2003, p. 879). As a result, scholars have organised their approach to the field in different ways, depending on their research intent. For example, March and Shapira (1992, p. 273) differentiate ‘individual choice behaviour’ from ‘organisational decision theory’.

In this overview of the field, intended as an orientation aid for the reader, theories of human judgement and decision making are grouped around the two main strands identified by Bazerman (2001, p. 353) and used by human information behaviour researchers investigating enough information and stopping behaviour:

- optimal decision theory, used in human information behaviour research to model stopping behaviour during information retrieval
- behavioural decision theory, used in more recent human information behaviour research to understand how people made decisions in the face of uncertainty.

Theorists from both the optimal and the behavioural decision school assumed rationality in the decision maker. Theorists from both schools define the term *decision* in similar ways, with Harrison's (1999, p. 5) definition highlighting the representative attributes of choice between alternatives and commitment to action:

> a decision is defined as a moment, in an ongoing process of evaluating alternatives for meeting an objective, at which expectations about a particular course of action impel the decision-maker to select that course of action most likely to result in obtaining the objective.

A key characteristic of both optimal and behavioural decision theory, sometimes jointly referred to as classical decision theory or rational decision theory (Pruitt, et al., 1997, p. 30) is the use of experimental studies to test hypotheses. However the behavioural school is differentiated by the integrating concept of bounded rationality, the view that human rationality is bounded by a number of constraints.

The work of scholars in the field of human information behaviour research has been informed by both optimal and behavioural decision theories (Harter and Hert, 1997, p. 32; Pettigrew, et al., 2001, p. 52). These theories have developed and expanded the field's understanding of both how information is used in decision making (e.g. Harrison, 1999) and of how people make judgements and decisions while seeking and using information (e.g. Zach, 2002). The theories have also been used in research into other types of information-related decisions such as resource selection made when information seeking (e.g. Wang and Soergel, 1998) and in the broader but related field of library and information science (e.g. Chu, 1994). Studies of this kind fall outside the scope of this thesis, the focus of which is judgements of enough information.

The following section reviews research findings on enough information and stopping behaviour in two groups:

- Studies that sought to understand stopping in information retrieval search within the framework of optimal decision theory
- Studies that investigated enough information and stopping behaviour within the framework of behavioural decision theory.

2.2.1 Optimal stopping points: Predictions during information retrieval

Stopping behaviour, or user termination of a search for information, has been of interest to human information behaviour researchers since studied conducted during the 1970s and 1980s. Optimal decision scholars, working on the assumption that the laws of logic and probability governed human thinking and reasoning, mathematically tested normative models of optimal decision making. Optimal decision theory was based on economic models and assumed that people identified and evaluated all options available to them before choosing the alternative that afforded them maximum or optimal benefit (Beach and Mitchell, 2005, p. 36-7; Browne, 1989, p. 32). Human information behaviour researchers investigated stopping behaviour using theoretical and experimental studies, framed within theories of optimal decision making, and used Bayesian probability theory to develop normative models capable of predicting user search behaviour. The particular focus of the human information behaviour studies was on information retrieval from databases and the overall intent of the research was to guide improvements in the performance of information retrieval systems, thereby increasing search efficiency and user satisfaction.

Stopping rules of satiation (stopping when all relevant articles have been found), disgust (stopping when having to examine too many irrelevant articles), or a combination of the two (stopping when satiated or disgusted, whichever came first) were hypothesised and tested mathematically by Kraft and Lee (1979) and Kraft and Waller (1981) in studies that sought to determine rules for the optimal stopping point (Kraft and Waller, 1981, p. 349). These researchers were interested in the length of information retrieval searches and how the hypothesised stopping rules affected that search length. Reporting on their tests Kraft and Lee (1979, p. 54) concluded further work was needed on developing a ‘dynamic model of user utility of information’, a model subsequently built and tested by Kraft and Waller (Kraft and Waller, 1981). Kraft and Waller observed that one

challenge with modelling information retrieval behaviour in this way was that predetermining the user's level of satiation or disgust was difficult.

Three different stop rules – time constraints, diminishing returns and frustration – were investigated by Morehead and Rouse (1982) as experimental research into stopping rules continued in the 1980s. This study identified the optimal solution, then constrained this optimum and compared the performance of different research subjects. Morehead and Rouse found this approach of value in 'identifying and understanding the constraints' (1982, p. 204) faced by information seekers. However like Kraft, Lee and Waller before them, they concluded that their modelling was insufficient to capture the dynamic nature of human information behaviour during information retrieval and to 'accurately mimic individual search strategies' (1982, p. 204).

In his modelling of stopping behaviour during information retrieval Kantor (1987) differentiated decisions about searching (what step to take next) and monitoring (to stop or continue the search). Using the Bayesian probability model, Kantor calculated estimates of the probability of success and demonstrated 'a very simple cutoff criterion' (p. 211) employing both the searcher's predication of success and their confidence in that prediction. This interest in predicting when people would stop seeking information has continued into the 21st century, with Huberman (2001, p. 45), for example, using theories of Brownian motion to predict the number of clicks web surfers will make before stopping.

Summary

The field of optimal decision making has afforded useful theories and tools for investigating decisions made when retrieving resources from databases. However while findings from these studies offered insights into the decision to stop seeking further information, a number of factors limited their applicability to information seeking and retrieval in the real world settings of interest to human information behaviour researchers studying information seeking and use in context.

The laboratory-based experimental research and mathematically modelling necessarily constrained the environments in which the experiments took place. In creating this

‘stable environment’ (Jungermann, 2000, p. 582), these researchers investigated stopping behaviour in situations far removed from the complexities and uncertainties of the real world settings in which human information seeking takes place (O'Reilly, 1982).

The assumptions that underpinned these studies included an assumption about the value of probability theory in explaining human information seeking behaviour. Probability theory focuses on decision making under risk, that is, when possible outcomes are known but the likelihood of each outcome occurring is not known. However subsequent empirical research revealed that not only were people unskilled at calculating probabilities (Jones, 2003, p. 398), they were also not inclined to do so in any explicit way when making decisions (Connolly and Thorn, 1987, p. 397). As a result, the attempts to understand decision making under uncertainty, as distinct from risk, through the use of probability theory have not resolved all questions about how people make decisions in real world settings. The experimental studies also neglected research participants’ own understandings of the problems they were being asked to solve (Jungermann, 2000, p. 583; Mellers, et al., 1998, p. 450). This neglect was acknowledged as a problem for human information behaviour research by Ingwersen (2001, p. 5) when he argued that the individual user of an information retrieval system has a model of her own work-task or information need, which may be different from the system designer’s cognitive model of that task or need.

As more has been learned about user-centred and situational searching for information (Anderson, 2003; Harter and Hert, 1997; Schamber, et al., 1990) it has become apparent that the ‘assumptions of certainty and order’ (Attfield, et al., 2003, p. 3), on which much of this early work on stopping behaviour was based, provided questionable foundations. Because of the artificially constrained settings, and the assumptions upon which the theories and models were built, the experimental and laboratory studies were unable to take into consideration the contextual factors which influenced search behaviour.

2.2.2 Satisficing and heuristics: Good enough information

Human information behaviour researchers investigating enough information and stopping behaviour continued to draw on decision theory as the field of human judgement and decision making evolved. Human judgement and decision making responded to the evidence that people's decision making behaviour violated the normative theories of optimal rationality (Connolly and Koput, 1997, p. 285; Gigerenzer, 2000, p. vii) taking a behavioural psychology perspective in their efforts to understand human decision making. This line of inquiry responded to concerns about the overly normative nature of the research objectives of the optimal rationality school and began to investigate when and how people deviated from the optimal decision making model (Kahneman, et al., 1982). Two constructs from the behavioural school of decision making are reviewed in this section because of their use in human information behaviour research into enough information and stopping behaviour and the insights they offer into these judgements and decisions. These two constructs are satisficing and heuristics.

The theory of bounded rationality and the related construct of satisficing (Simon, 1997) were particularly influential within the behavioural school of decision theory. Researchers in domains such as political science, public policy and psychology have drawn on the theory of bounded rationality to understand how decisions are made (Hanoch, 2002, p. 2; Jones, 2003, p. 396; March, 1994, p. 9). Simon theorised that an individual's ability to reach an optimal decision is constrained by cognitive limitations (Simon, 1997, p. 291) and by time (Simon, 1992, p. 50). Although Simon originally proposed only these two constraints, additional constraints have subsequently been posited, particularly constraints that operate in the workplace. For example, organisational goals may be constraints on decision making in organisations (O'Reilly, 1983, p. 108) and 'legal restrictions, organisational structure and the locus of responsibility for the search activity' (Harrison, 1999, p. 91) may constrain workers.

Simon's ideas on two important and inter-related constructs, satisficing and aspiration levels, provided insights into judgement and decision making during information seeking and use. Satisficing behaviour was one response to bounds on optimal rationality. In an information context, satisficing suggests people stop searching at the

point of recognising that the information they have is good enough, even while possibly acknowledging that further searching may well yield additional – even better – information. The application of satisficing was not widely used in human information behaviour research before the 1990s (Marchionini, 1995, p. 5). However several researchers have drawn on the theory since that time and research findings have provided evidence that people do satisfice when seeking information (Hjorland and Christensen, 2002, p. 961; Savolainen, 2007, p. 619; Stefl-Mabry, 2003, p. 880).

Satisficing sees people accepting an alternative good enough to allow them to achieve the outcome they seek rather than seeking the optimal outcome. Satisficing acts as a stop rule and occurs against pre-existing levels of aspiration, shaped by both individual experience and contextual factors (March, 1994, p. 23). Aspiration levels – 'the dividing line between good enough and not good enough' (March, 1994, p. 22) – operate on a number of dimensions. Aspiration levels do not remain stable (March, 1994, p. 22) in part because they are shaped by the experiences of both the individual and of others with whom an individual has contact (March, 1994, p. 22). In a sequential search, as soon as the searcher comes across an alternative that meets the level of aspiration for that dimension, the search is concluded. If there are multiple dimensions along which decision is to be made, then aspiration must be met in a good enough way along each of them.

A second response to the bounds on optimal human rationality reported by behavioural decision researchers was the use of 'heuristic principles' (Marchionini, 1995, p. 66; Tversky and Kahneman, 2000, p. 25). Heuristics are rules of thumb that help people, when making decisions, recognise patterns and invoke appropriate, often short-cut responses (March, 1994, p. 13), based on experience and training (Choo, 1998, p. 12). Use of heuristics in human information behaviour research appeared initially in experimental research in the area of information retrieval, as researchers sought to identify and test heuristics used in database and more recently web searching (e.g. Brooks, et al., 1979; Harter and Peters, 1985; McKibbon, et al., 2007; Rouse, et al., 1982; Shyam Sundar, et al., 2007; Vazey and Richards, 2006). The later studies, acknowledging the move towards naturalistic and user centred research, moved out of the laboratory and investigated information retrieval in real world settings. However the

focus of most human information behaviour studies was primarily on heuristics used as part of search strategies rather than as rules of thumb to determine the end of the search or that enough information was to hand.

An intriguing extension of the line of inquiry into human rationality and the use of heuristics comes from Gigerenzer and his colleagues. Gigerenzer proposed the concept of 'ecological rationality' (Gigerenzer, 2001, p. 38) in an attempt to move attention away from the perceived inadequacy of the human mind that underpins much of the research into decision making in the field of cognitive psychology. Gigerenzer argued that ecological rationality more closely reflects the ways in which humans make inferences about their worlds. Rather than being bounded, human rationality is ecologically adaptive and humans use a range of 'fast and frugal heuristics' (Todd, 2001, p. 52) such as 'one-reason decision making'. Gigerenzer and Todd argue that the success of these fast and frugal heuristics should be assessed by how well they aid humans in adapting to either the physical or the social world rather than against the mathematical norms of Bayesian probability theory. Although an intriguing and promising concept, much of the work on ecological rationality and fast and frugal heuristics remains experimental and the approach has not been used to date by human information behaviour researchers.

Four investigations into enough information and stopping behaviour have drawn explicitly on the theory of bounded rationality and satisficing to understand the decisions being made during information seeking (Agosto, 2001; Mansourian and Ford, 2007; Prabha, et al., 2007; Zach, 2002) and to a lesser extent on the construct of heuristics. Agosto (2001) investigated web surfing behaviour of young people while the other researchers tested the theory of bounded rationality empirically in naturalistic settings such as the workplace (Zach, 2002) and academia (Mansourian and Ford, 2007; Prabha, et al., 2007).

Inquiry into the concept of enough information and the influences on the arts administrators' decision to stop seeking more information was one dimension of Zach's exploratory investigation into the information seeking and stopping behaviour of 12 senior arts administrators (Zach, 2002). Zach sought to find out which stopping criteria

influenced arts administrators in assessing enough information and ending their information seeking. Zach reported time as an issue for the arts administrators when determining if they had enough information. However, she positioned time – together with a sense of 'comfort' (2005, p. 31) with the amount of information found – as a 'stopping rule' (2005, p. 31) rather than as a constraint and reported that time played a lesser role in the assessments of enough information. When there was conflict between time factors and a sense of comfort with the amount of information found, the arts administrators satisficed even if more information was known to be available (Zach, 2002, p. 156). In turn the arts administrators' level of comfort with the information found was a function of the task that had triggered their information seeking activities. Zach's findings on the roles of task and amount of information in relation to judgements of enough information supported Kuhlthau's conclusions about enough information reported in *Section 2.1: Assessments of enough information.* However, like Kuhlthau, Zach focused less on *how* the arts administrators weighed the balance between information needed for task completion and information available.

In the end, Zach concluded that the arts administrators followed a 'highly intuitive process' in determining if their information need had been met (Zach, 2005, p. 32) rather than relying on pre-determined stopping criteria. However, role of intuition in assessing enough information was not addressed explicitly by Zach although she concluded that while this intuitive approach may be acceptable in 'familiar situations' (Zach, 2005, p. 32) it would not serve arts administrators well when they faced tasks of increased complexity or high impact. Diminishing relevance and increasing redundancy in the information found also played a role in the arts administrators' decisions to stop seeking information.

Stop rules used when satisficing academics' and students' information needs were also the focus of findings reported by Prabha et al (2007) as part of a large scale research project. In describing their research design Prabha et al (2007) provided an example of the entangled nature of enough information and stopping behaviour in the research literature. Participants in their study were asked 'what made them decide that the information they had was enough', with this question equated to the criteria used by participants 'to stop looking for information' (Prabha, et al., 2007, p. 81).

Both academics and students in the Prabha et al study reported using the time available and redundancy of information as cues to stop looking for more information. As well as these areas of overlap between the two groups, Prabha et al also reported different stop rules used by students and academics. Among the criteria used by students were more physical cues such as the number of pages required or the number of citations used (p. 81) whereas the academics considered their need for representative coverage of a field or current sources. The performance of an 'exhaustive search' (p. 84) and collegiate feedback also featured in the decision making of the academics, the latter cue paralleling the findings of Foster reported in *Section 2.1: Assessments of enough information*. The student participants focused more on gathering sufficient information to be sure they understood the concepts involved in their assignments. Other cues used by the students were the accuracy of the information gathered and being able to answer their assignment questions. These differences were not an expected outcome when aspiration levels, considered earlier in this section, are taken into account since different groups, seeking information for different purposes, could be expected to consider different criteria to be important.

In an investigation into decisions made by young people while surfing the web, Agosto (2001) also drew on bounded rationality and satisficing as a theoretical framework for the small scale exploratory study. Agosto reported the anticipated time and cognitive constraints operating during web-based searching. However she identified a further constraint arising from long sessions of computer use, that of physical discomfort. As did Prabha et al (2007), Agosto concluded that 'satisficing is not the only stop rule' (2002, p. 23). She identified additional stop rules of physical discomfort, boredom, self-imposed time limits, and 'snowballing', a kind of redundancy (Agosto, 2002, p. 24) that is reminiscent of the redundancy of information reported by Kuhlthau. Agosto reported that the young web surfers stopped searching even before they had found a satisficing choice (2002, p. 25) a finding not in line with Simon's theory. Using Agosto's coding frame when analysing data gathered as part of a study into academics' decision making while web searching, Mansourian and Ford (2007) found that the academics exhibited satisficing behaviour and drew on a number of cues to signal search closure. These cues included shortage of time (p. 685), physical and mental

discomfort (p. 687), effort required (p. 687) as well as the boredom, self imposed time limits and redundancy of information (p. 689) reported by Agosto. Like Zach and Agosto before them, Mansourian and Ford also found that the theory of bounded rationality and satisficing did not account for all 'search-related decision making' (p. 691). In particular, they also identified additional constraints in the form of concern about missing information, and 'search satisficing strategies' (p. 693), concluding that 'different search strategies may render different satisficing approaches more or less relevant' (p. 696).

A different perspective on understanding how and when people satisfice when deciding to stop seeking more information used a cost benefit approach. Harrison (1999) writing about managerial decision making investigated costs and benefits associated with information seeking and stopping. Harrison tried to isolate the point at which this happens, that is, the point at which the cost of seeking more information outweighs the benefit to be derived from that information. However, recognising the variability of real world practice, Harrison proposed a theoretical 'zone of cost-effectiveness' (pp. 49-50) within which the decision to stop is made, rather than a single decision point. A major problem with using cost benefit analysis when modelling decisions during information seeking is that the future value of the information to be calculated in the cost/benefit analysis cannot be known with any certainty. This concept of cost, either in dollars, time, or effort expended, for the return obtained from additional information was further explored through foraging theory (Sandstrom, 1994).

Information foraging research also takes as a point of departure the stance that human rationality is bounded (Pirolli and Card, 1999; Ward, 1992). Research findings offered insights into the assessment of enough information. For example, foraging theory appears to have informed Bates (2002) proposition that people gather information a piece at a time, until they had found 'everything wanted' (p. 10) and seek information diet breadth till satiated. This proposition recalled the optimal stop rule of satiation tested by Kraft and Lee (1979) and Kraft and Waller (1981). The alternative to individual satiation appears to be continuing until the resource (information) is exhausted. Although exhausting the resource seems an unlikely situation in an environment of abundant information, the academics in Prabha et al's (2007) study did

report the completion of an exhaustive search as one of the cues they used when assessing enough information and deciding to stop seeking more information.

A major problem with using information foraging theory to explain assessments of enough information is that it equates food, a tangible and non-renewable resource, with information, a resource (Braman, 1989) and which may be reused or repurposed. Sandstrom (1994) dealt with this challenge in her theoretical consideration of the value of foraging theory to human information behaviour by operationalising the key foraging concept of currency as novelty of information in the world of scholars [1]. Sandstrom argued that foragers 'quit' (p. 433) their searching when diminishing returns suggest that the effort to find more outweighs any future benefit. To date, Sandstrom's theory remains untested in an empirical setting.

The main focus of information foraging studies is on the different strategies used when moving between patches rather than on cues used to signal a stop to seeking information. For this reason the investigations into foraging behaviour were not particularly illuminating on the question of how people assess they have enough information. Further questions about the adequacy of foraging theory to explain assessments of enough information arose from findings reported by Solomon who found that people gathered more information than was needed or used (1997b, p. 298).

Summary

Bounded rationality and satisficing are intuitively attractive as explanations of how people make judgements and decisions and these theories have been instrumental in advancing the theoretical development of human information behaviour research in the area of decision making while information seeking. Decision researchers have accepted the theory of bounded rationality to the extent that, by 2000, Jungermann (2000, p. 587) was confident in stating that all approaches to understanding human judgement and decision making 'assume that there are boundaries for rationality in situations of cognitive overload'.

[1] Sandstrom framed her work with optimal decision theory, but it is discussed here with the later foraging studies for the benefit of the reader

The cues identified in investigations informed by behavioural decision theory into enough information and stopping behaviour were:

- time available
- comfort with the amount of information gathered
- physical discomfort
- boredom
- number of pages or citations sourced
- representative coverage of a topic
- redundancy of information
- diminishing relevance of information
- completion of an exhaustive search
- currency of information
- feedback from colleagues
- understanding or making sense of concepts.

Similarities were apparent with a number of findings reported in the studies into enough information reviewed in *Section 2.1: Assessments of enough information*. Support was evident for the role of time, redundancy of information and diminishing relevance of information as cues in assessing enough information and ending the search for information. The need to understand or make sense of concepts also reflected but did not appear to be identical to the sense of solving the puzzles presented by work tasks or assignments that emerged in the findings reported in *Section 2.2: Assessments of enough information informed by decision theory*.

The human information behaviour researchers whose studies were reviewed in this section drew on satisficing as a key framing construct, understanding satisficing as *the* stop rule that operated on a number of different dimensions, each with their level of aspiration. The researchers either began from the assumption that information seekers are satisficers (Prabha, et al., 2007, p. 75) or concluded from their findings that the theory was useful in explaining some aspects of enough information and stopping behaviour (Agosto, 2001; Mansourian and Ford, 2007; Zach, 2002).

However all four studies reported a number of stop rules other than satisficing and several of these researchers found satisficing and stop rules as theorised by Simon were inadequate in fully explaining assessments of enough information. Zach for example was unable to get beyond an instinctive intuitive response from arts administrators about how they assessed they had enough information. The level of comfort was 'arbitrary' (Zach, 2002, p. 154) although the arts administrators were content with ''enough' comfort' (Zach, 2002, p. 196). Other researchers went beyond Simon's original argument that satisficing acts as *the* stop rule that operates on one or more dimensions or criteria. Agosto and Prabha et al both reported that satisficing was not the only stop rule used by participants and identified additional stop rules such as boredom (Agosto, 2002, p. 25) or exhaustive searches (Prabha, et al., 2007, p. 83).

The research findings suggested people use a range of cues to signal they have enough information. Some cues were affective responses such as comfort and confidence. Other cues are cognitive responses such as the recognition of increasing redundancy in the information gathered. Two studies also revealed a physical cue in the form of physical discomfort from long sessions at the computer. What remains unclear however is whether these cues are being used as a set of heuristics referred to collectively as stop rules or whether they represent different dimensions of the decision to stop seeking information, each of them with a different aspiration level that must be met before the information seekers invoke the stop rule of satisficing.

In reporting their findings, it appears the researchers may have been treating the concept of stop rules (Agosto, 2001; Prabha, et al., 2007) or stopping criteria (Zach, 2002) as a particular set of heuristics, that is, as rules of thumb that signalled search closure or enough information rather than relying on the explanatory power of satisficing as the single stop rule used in assessments of enough information and stopping behaviour. Despite the somewhat different interpretations of satisficing behaviour and stop rules evident in these studies, it is clear that information seekers satisfice and that different groups of information seekers use a range of different cues in their evaluations of a good enough resolution of their information need.

One of the reasons for the perceived inadequacy of satisficing as a single stop rule may be that Simon's theories were based on the premise that information is considered in a sequential item by item manner although decision theorists have subsequently acknowledged the search for alternatives can happen in parallel (Harrison, 1999, p. 46). Sequential item by item decisions made at a single moment of choice may be an appropriate way to conceptualise decisions made when selecting resources during information retrieval although recent research findings (Anderson, 2003) have revealed that relevance judgements and resource selection is more complex than suggested by early information retrieval research. However using this conceptualisation is less appropriate when considering what we are learning about the complex and iterative nature of real world information seeking and use and the ways in which people assess enough information and decide to stop seeking more information.

A final point when considering how the theory of bounded rationality has served human information behaviour researchers investigating enough information and stopping behaviour is to clarify that satisficing should not be confused with satisfaction – or indeed, satiation. For example, in the Choo et al study (2000) reviewed earlier in this section, a particular information search mode is characterised inter alia as 'satisfying' even though the researchers appeared to be drawing on the theory of bounded rationality to inform their study. Although satisfaction is used as a measure of success when evaluating for instance a retrieval search system (e.g. Harter and Hert, 1997), this concept is different from satisficing, which was originally defined by Simon as 'a blend of sufficing and satisfying' (Gigerenzer and Goldstein, 1996, p. 651).

Foraging theory was another approach that appeared to afford useful insights when applied to the question of *what is enough?* In particular by addressing this question in the form of information diet breadth and satiation instead of in the form of stop rules, foraging theory broadened the focus of attention so that enough information could potentially be examined as part of an holistic experience of information seeking and use. However while overall an intriguing approach to understanding information seeking activities, foraging theory did not afford fine-grained insights into how people assess enough information or why they stop seeking more information.

2.3 Enough information and stopping behaviour: Key considerations for the thesis

The review of the literature drew on studies that approached the phenomenon of enough information from a range of different perspectives and in different settings. The review identified a number of themes that provide insight into the cues used by people in making the assessment of enough information and deciding to stop seeking information. The following overview of the literature review summarises the key considerations for the thesis.

Clearly information seekers are satisficers. There is strong evidence that people in a range of settings and seeking information for different purposes were comfortable with working with information that is good enough, in terms of either volume or quality. However there is also evidence that the criteria used in satisficing, in determining what is good enough varies from setting to setting and purpose to purpose as people used a number of cues as signals that they have enough information or that it is time to stop seeking more information.

Time was also a common factor across the different studies. Tasks requiring information seeking, whether educational assignments, research projects or workplace tasks, exist within a timeframe that has an end point imposed a deadline, a date by which information seeking must come to an end. Task, either a work task or an assignment task, also played a role in assessing enough information.

Another strong theme in the findings on assessments of enough information and stopping behaviour was the constructivist sense making by both students (Kuhlthau, 2004a; Limberg, 1999; Parker, 2006) and academics (Foster, 2004). For workers, the sense of filling in puzzle, or of being prepared to answer anticipated questions (Kuhlthau, 2004a) showed some similarities with the experiences of the arts administrators who reported being comfortable (Zach, 2002) that the information gathered was enough to make a decision. Diminishing relevance and a sense of diminishing returns from the effort expended in seeking information is reflected in the redundancy reported by Kuhlthau (2004a), Prabha et al (2007), Agosto (2001) and Zach (2002) as signalling an end to information seeking. Associated with a number of these

factors were affective responses such as confidence and comfort with the amount of information gathered.

There were also differences evident between the experiences of students and workers. In the workplace the key signals that enough information had been gathered were closely linked to the task that had triggered the information seeking. The studies into work-based information seeking did not reveal the emphasis on individual standards for the quality of the task that was characteristic of students' assessments of enough information. Conversely the changed knowledge structures were predominantly associated with students' experiences of enough information. Cues associated with the physical output of the task were also more strongly associated with students' assessments of enough information. *Table 2.1* brings together an overview of research findings from all three sets of literature on enough information and stopping behaviour reviewed in this chapter. More research is needed however on understanding not only *what* cues are used, but also *how* people use those cues in making the assessment of enough information.

Those researchers into enough information and stopping behaviour who drew on decision theory have expressed concern with the adequacy of the dominant decision making theories to fully explain how people make the assessment of enough information and end their information seeking. This reported inadequacy appears to stem from three areas of concern: the classical definition of a decision; the acceptance of search as an item by item evaluation; and the neglect of the potential influence of contextual factors.

The definition of a decision as a commitment to action at a moment of choice precludes investigation of all that has led up to that moment of action. The assumption that the concept of search in decision theory always requires an item by item evaluation until an acceptable alternative is found does not reflect empirical findings on information seeking and use. Theories from both the optimal and behavioural schools of decision making focus strongly on individuals and their cognitive states when making judgements and decisions, explicitly quarantining people from the environment in which they make judgements and decisions.

Table 2.1 Cues when judging enough information and deciding to stop

	Study Participants			
	Workers	*Academic Researchers*	*Tertiary Students*	*School Students* [a]
Cues			Accuracy of information [b]	
	Answers to questions [c]		Answers to questions [b, c]	Answers to questions [c]
		Boredom [b]	Boredom [b]	Boredom [b]
		Changed knowledge structure [c]	Changed knowledge structure [c]	Changed knowledge structure [c]
	Comfort [b]			
	Confidence [c]			Confidence [c]
		Coverage of field [b]		
		Currency of sources [b]		
		Discomfort, mental [b]	Discomfort, mental [b]	
		Discomfort, physical [b]	Discomfort, physical [b]	Discomfort, physical [b]
			Effort put in [c]	Effort put in [c]
		Feedback [b, c]		
	Information need met [b, c]	Information need met [b, c]	Information need met [b, c]	Information need met [c]
			Personal standards [c]	Personal standards [c]
			Physical output [b, c]	
	Puzzle solved [c]			
	Redundancy in information [b]	Redundancy in information [b]	Redundancy in information [b]	Redundancy in information [c]
		Resources exhausted [b]		
			Self imposed time limit [c]	
	Task [b, c]			
	Time [b, c]	Time [b, c]	Time [b, c]	Time [b, c]
			Understanding, making sense [b, c]	

a Agosto's study used simulated questions as tasks for high school students. b Studies using behavioural decision theory. c Studies not drawing on decision theory

For human information behaviour researchers studying information seeking and use in context the artificial separation of individuals from the contexts in which they seek and use information is a major limitation on the explanatory power of these theories. An emerging approach to understanding decision making in real world settings, naturalistic decision making, may provide a sounder basis from which to investigate judgements of enough information.

2.3.1 Naturalistic decision making

Naturalistic decision making is a theoretical approach that seeks to understand judgements and decisions within the contexts in which they are made. Researchers

associated with the field of naturalistic decision making and working in applied settings during the 1980s and 1990s found that decision making as experienced by the experts they were studying did not follow the models of either the optimal or the behavioural decision theorists, that is, evaluation of and choice between alternatives.

In contrast to the earlier reliance on mathematical and experimental studies, naturalistic decision making researchers were keen to understand why the participants in their early studies reported that they did not in fact make any decisions. In yet another evolutionary step in human judgement and decision making theory development, this group of researchers expanded their perspectives to include naturalistic settings and interpretive methodologies, as they sought to understand the process of decision making in the real world.

Naturalistic decision making researchers found that people, when making judgements and decisions in real world settings characterised by complexity, uncertainty and time stress, and working with tasks that are vague and unstructured, developed mental models of the situation. The mental models of experienced workers were 'internal representations of problems that are formed over a period of time by various experiences of a similar nature' (Maqsood, et al., 2004, p. 297), and are changed, updated and refreshed by the workers as they moved through time and space (Lipshitz and Ben Shaul, 1997, p. 298). Mental models 'develop from what works in experience' (Westbrook, 2006, p. 567) and help individuals both understand their environment and predict outcomes.

The experienced decision makers continually assessed the feasibility of their mental models through a process of mental simulation, a technique that in uncertain situations helps continually check the plausibility of the 'story' as the situation develops and changes around them (Lipshitz, et al., 2001, p. 338). They assessed and updated their awareness and understanding of a situation as part of an iterative process towards determining appropriate action, identifying 'critical factors in the environment' and developing an understanding of 'what will happen in the near future' (Endsley, 1997, p. 270). From that assessment flowed appropriate action. The appropriate action may be selected from existing repertoires or tested via mental simulation. When faced with

unfamiliar situations, the experts sought more information before constructing the mental models.

The mental modelling, updating and plausibility checking helped experts see the flaws in the actions they were considering. The experts did not evaluate and choose between a range of options before making a decision but rather took action on the first feasible model that presented itself (Lipshitz, et al., 2001, p. 335). While this behaviour has parallels with satisficing behaviour, it did not appear to represent the classical definition of a decision as a choice between two options.

Naturalistic decision making theory has not been used in human information behaviour research to date, nor have any studies into enough information and stopping behaviour drawn on this field. Nonetheless tentative links can be made between the findings on enough information and findings reported by naturalistic decision making researchers on the use of mental models. Mental models have not featured prominently in the human information behaviour research into enough information and stopping behaviour. However similarities can be seen between the stage of task formulation reported by Kuhlthau (2004a) and the conceptual structure of task critical to their performance reported by Vakkari (1999), discussed in *Section 2.1: Assessments of enough information* and the development on mental models through which the experts studied by naturalistic decision making researchers captured those factors salient to the task in a complex and dynamic external environment.

2.4 Enough information in context

With the broadening of the research repertoire of the field of human information behaviour and the emergence of a more user-focused approach, deeper understandings have developed of the many influences on human information behaviour (Case, 2002) and of the complex inter-relationships between these influences (Fidel, et al., 2004). The recognition that people do not live and work in an experimental vacuum, and that the settings in which they seek and use information play an important part in shaping their attitudes and behaviours has led researchers to develop perspectives which permit the

study of the individual in social or organisational settings (Chatman, 2000; Dervin, 1997; Pettigrew, et al., 2001; Sonnenwald, 1999).

It is within context that we find 'the basic motivation and impetus' (Kuhlthau, 1999a, p. 10) that triggers information seeking behaviour. Contextual factors influence human information behaviour at all levels and through all stages of the information seeking process (Cool, 2001; Courtright, 2007; Dervin, 1997; Sonnenwald, 1999; Talja, et al., 1999). Even more importantly it is context itself that 'determines 'what is enough'' (Kuhlthau, 1999a, p. 18) and a key assumption underpinning this thesis is that contextual factors will influence assessments of enough information. In this section the nature of context in human information behaviour research is examined and a framework put forward for understanding the cues and signals reviewed in *Section 2.1: Assessments of enough information* as influences on judgements of enough information.

2.4.1 The nature of context

While the importance of context is recognised by human information behaviour researchers, the field has not yet reached consensus either on how most appropriately to conceptualise the concept or on which factors exert strong influences on information seeking behaviour (Cool and Spink, 2002, p. 1730; Courtright, 2007, p. 291). A number of human information behaviour researchers have viewed environment and context as interchangeable terms (e.g. Bystrom and Hansen, 2005, p. 1052; Lamb and Kling, 2003, p. 31). Bystrom and Hansen, for example, defined context as 'environment or domain' (2005, p. 1052) and differentiated two types of environment – the abstract, comprising for example, norms and values, purposes, goals and routines, and the physical, comprising for example, information resources, people, and information and communications technologies. Other researchers, for example, Taylor (1991) and Lievrouw (2001) used the term environment to describe those phenomena external to the individual although Taylor's model of an information use environment situated the individual information seeker in their information use environment. For Dourish as well context is a 'set of descriptive features of settings' (2004, p. 22) in which people seek and use information. In her attempt to make visible the concept of context, Sonnenwald (1999) avoided all mention of environment. Sonnenwald instead worked at the level of context and situation, turning to the relationship between the two in defining

context as the ‘quintessence of a set of past, present and future situations’ (p. 178). Alternative terms used to describe this phenomenon include setting, information worlds or information grounds (Fisher, et al., 2005) and arena (Anderson, 2007). Environmental or contextual factors are often grouped into different sets, for example, the physical, social, organisational and technical dimensions of environment (Preece, et al., 2002, p. 207) or economic, social, political or legal factors (Bridgman and Davis, 2004, pp. 57-64). This approach to portraying environment suggests that environment is somehow broader and more enduring than context.

Conceptualising context as an ‘independent entity’ (Dervin, 1997, p. 18), separate from and external to the phenomena being studied constrains researchers’ understandings of the ways in which contextual factors interact with people who are seeking and using information. Such an approach ignores the multi-dimensional and multi-layered interplay between person, phenomenon and contextual factors. Acknowledging this inter-relationship requires researchers to accommodate in their studies the relational and dynamic nature of context (Dourish, 2004, p. 28). An understanding of the role of contextual factors can only be deepened if, as well as identifying what factors influence information behaviour, researchers also investigate how those factors interact with human information behaviour.

Contexts are not separate and discrete from each other since different contexts ‘may share common attributes’ (Sonnenwald, 1999, p. 179) a characteristic reflected in the malleable boundaries (Courtright, 2007, p. 277; Sonnenwald, 1999, p. 179) that are also a feature of context. The ‘relational’ nature of context (Dourish, 2004, p. 22) suggests that that any given factor in the external environment may or may not be contextually relevant for a particular individual at a particular place and time. As well as being shared, relational and malleable, context is also dynamic in that it arises from the activity being carried out – it is not something separate and independent, waiting to be discovered (Dourish, 2004, p. 22).

There are two aspects to the dynamic nature of context. Firstly, through ‘forms of engagement’ (Dourish, 2004, p. 28) with the environment or setting, particular factors in the environment are invoked as context for a particular activity. This sense of the

individual invoking context at a particular time and place is reflected in Sonnenwald's (1999, p. 178) understanding that although people operating in a context share some common aspects in their understanding of what that context is, different people will see and understand that context in different ways. While potentially, everything that is not the individual nor research object (if different from the individual) may be considered as an element in the environment, each individual will draw out of that environment those factors which are relevant and salient to the task or activity at hand (Sawyer and Eschenfelder, 2002, p. 436). Secondly, there is the process through which people 'build up and reformulate their understandings of the larger social situation, or context, by using multiple sources of evidence available to them in the environment' (Cool, 2001, p. 20) to create and over time sustain those shared albeit different understandings of context.

In summary, context can therefore be seen as a smaller subset of everything that exists around the individual or the phenomenon under study. Contextual factors in this study that underpinned the thesis were understood by the researcher as those factors in the environment which are related and salient in some way to the individual and the phenomenon itself, in this research, the assessment of enough information. This understanding of the nature of context is also congruent with the interpretive stance taken in the empirical study and discussed in Chapter 3.

2.4.2 Relationships between people and contexts: Invoking context

Beyond the challenge of defining context, an additional, related challenge faces human information behaviour researchers grappling with the concept. That challenge is how to conceptualise the relationship between people and the dynamic and malleable contexts in which they seek and use information.

Clues about the process through which people invoke context may be found in Sonnenwald's definition of context as the 'quintessence' (1999, p. 178) of a set of situations. As environment and context have been used interchangeably and differently in the literature, so too have the terms context and situation (Cool, 2001, p. 7). However there is consensus emerging that the two are distinct concepts. Contexts are better understood as 'frameworks of meaning' (Cool, 2001, p. 8) with situations seen as more

dynamic (Cool, 2001, p. 8; Sonnenwald, 1999, pp. 179-80). This understanding is captured by Bystrom and Hansen (2005, p. 1052) in their descriptions of contextual factors being 'stable over longish periods' whereas situational factors are 'of a transient nature' (p. 1053) which are characterised by a more dynamic and interactive nature, a period during which individuals interpret what is going on around them, drawing, at least in part, on their understanding of their context to make sense of the situation. The relationship between the two concepts is an embedded one; however individuals may need to call on more than one context or framework when making sense of a situation.

In her review of the literature, Cool (2001, pp. 9-10) identified six different approaches to understanding and using the concept of situation to understand information seeking and use. In this thesis, situation awareness, that is, an 'accurate understanding' of the situation (Sonnenwald, et al., 2004, p. 991), with its focus on the processes of decision making (Cool, 2001, p. 21) appeared more relevant to this thesis because situation awareness focuses attention on the process through which context is invoked when making assessments of enough information.

Three differentiated hierarchical levels of situation awareness were differentiated by Endsley (1995) in a definition that accentuated the relationship between situation awareness and task. Firstly, people perceive cues in the environment that are salient to a task. Secondly, they develop a snapshot of what is happening, starting to make sense of those cues and their inter-relationships, and thirdly, the perception and comprehension provides the capacity to predict what might take place as the situation unfolds in the future. People often start with a limited number of cues and continually update their situation awareness as more information is received, which in turn creates more confidence in their comprehension of the situation and their predictions of future actions (Endsley, 1995, p. 45).

The relationship between mental models and situation awareness is an interesting aspect of Endsley's work. Mental models, which help experts quickly read and understand a newly encountered situation, are seen by Endsley as 'prototypical situations in memory' (1995, p. 34). Not all factors external to the individual are part of the context for a given task in a given situation but as an individual scans the environment, through the lens of

experience and the process of creating a mental model, she picks up cues about factors that are salient to the task in hand. There are strong parallels between Endsley's views of situation awareness and Vakkari's (1999, p. 826) description of the early stages of task-based information seeking, when task dimensions are unclear and mental models vague.

Importantly, the salient elements identified when reading a situation will differ (Lievrouw, 2001, p. 12) depending on the individual and the context in which she is operating. Although Cool (2001, p. 25) argued that these elements 'cannot be specified across all interaction environments', Endsley (1995, p. 37) taking a position similar to that of Taylor in relation to 'typical' IUEs (Taylor, 1991, p. 221), argued that elements of situation awareness can and should be specified for particular arenas. It is in this way that over time, the relationship between people and the contexts in which they work evolves in a mutually inter-dependent and recursive way.

Taylor's starting point was purposive information seeking to resolve problems in the workplace and he distinguished the IUE as a subset of the total external environment, comprised of those environmental elements that were most salient to information seeking and use. The IUE model as initially proposed by Taylor consisted of four elements:

- sets of people, with typical patterns of information behaviour
- problems
- settings
- problem resolutions.

Particular *sets of people*, argued Taylor, were likely to share habitual practices such as media use, or social networks, or a range of characteristics such as attitudes towards risk. *Types of problems* were associated with a particular set of people and could be delineated along four dimensions: the extent to which they were well or ill-structured; complex or simple; based on agreed assumptions and exhibiting new or familiar patterns. *Settings* were to do both with the physical environments in which people and problems were found, as well as the 'constraints and opportunities' (Taylor, 1991, p.

221) offered by those settings and included dimensions such as the structure and style of the organisation, domains of interest and access to information. *Resolutions to problems* focused on assumptions made by people about what represented an acceptable way of resolving the problems commonly encountered, described along two dimensions.

The work of Sonnenwald et al (2004) also offered insights into how 'typical' types of situation awareness may be mapped. Investigating scientists in geographically dispersed locations whose collaborative work was mediated by ICTs, Sonnenwald and her colleagues identified three interlinked types of situation awareness needed by the study participants: contextual information that provided a broad framework of meaning, information on the task to hand, and 'interpersonal information' (Sonnenwald, et al., 2004, p. 994) such as skills, work styles or emotional state.

In summary, situation awareness is understood as the process through which people attend to particular elements in the environment which are brought into play as contextual elements for their information seeking and use. Situation can be seen as that point in time at which context is 'occasioned' (Dourish, 2004, p. 22). For a particular individual carrying out a particular information-related task at a particular time and place, particular environmental factors will become salient through a process of situation awareness, and may be recognised by an individual as the context for that task. This conceptual understanding of the relationships between people, tasks and contexts builds on the person-in-situation framework of Allen and Kim (2000) positioning situation awareness as a process through which interactions occur between the individual and the contexts in which they seek and use information.

The diverse definitions drawn on in *Section 2.4: Enough Information in Context* represent different meta-theoretical orientations to knowing and understanding the relationship between the individual information seekers, their information seeking and use behaviour, and the contexts in which this behaviour occurs. These different orientations however share a perspective on the world that situates them as 'user-centred' (Pettigrew, et al., 2001, p. 43), a conceptual development that grew from the move away from a systems or resources orientation. The essence of this position is that human behaviour including human information behaviour is shaped by social and

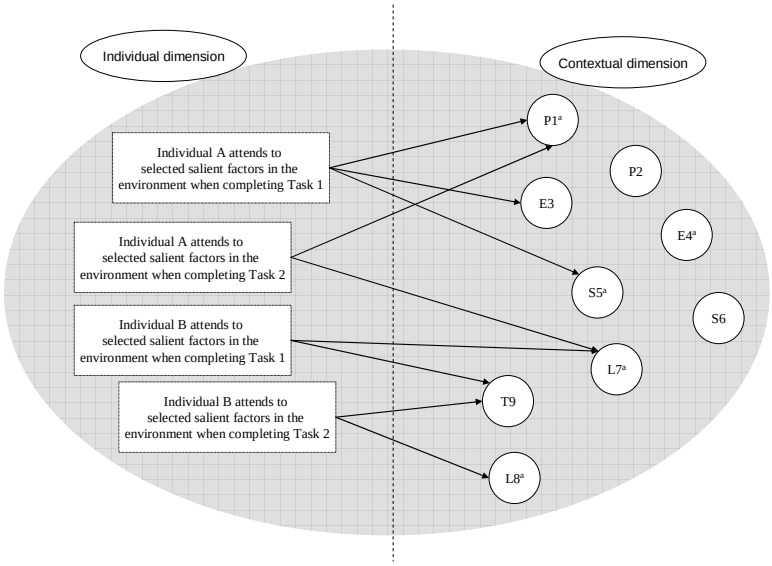
cultural practice and experience, and that cognition, while an individual activity, is socially and culturally situated.

However within this broad approach to understanding human information behaviour, the distinction may be made between a 'dualistic' approach to understanding the relationship between an individual, information and context and an 'non-dualistic' approach (Limberg, 1999). The understandings of enough information reviewed in *Section 2.2.1: Optimal stopping points* and *Section 2.2.2: Satisficing and heuristics* that drew on the human judgement and decision making literature generally appear to be underpinned and framed by what Talja, et al (2005, p. 83) term the 'cognitive constructivist' approach. As an example, Allen and Kim (2000) understand this relationship as *person-in-situation.* The descriptor used by Allen and Kim suggests that person and situation are distinct and separate, that the individual, while influenced by contextual factors, exists outside and independently of the context in which they find themselves (Talja, et al., 2005, p. 83). Talja et al point to Kuhlthau's model of the information search process as an example of cognitive constructivist approach. Another example reviewed in this chapter that typifies this approach is Endsley's work on situation awareness.

An alternate view – the non-dualistic approach – understands 'person and world to be internally related' (Marton, 1996, p. 175). This view sees human society comprising individuals whose behaviour flows from and is conditioned by their interpretations of the world. The perspective is aligned with Vygotsky's social constructivist theory of cognitive development (Talja, et al., 2005, p. 85), which understands that 'people actively construct cognitive practices in a social-cultural context' (Anderson, 2003, p. 68). Following this line, the individual's information seeking and use is embedded within 'social, organisational and professional contexts' (Talja, et al., 2005, p. 86). The research into enough information reviewed in *Section 2.1: Assessments of enough information* is framed within both the 'cognitive constructivist' approach and what Talja, et al (2005, p. 85) term the 'collectivist' approach. Such diversity of meta-theoretical approaches to understanding enough information is neither unexpected nor undesirable. Different meta-theories may be used as 'orientation strategies' (Talja, et al., 2005, p. 92) depending on the nature of the research questions that trigger inquiry.

The framework depicted in *Figure 2.2*, depicting the relationships between environment, context, situation and individual, suggests that the factors identified in previous research as influencing assessments of enough information may be separated into two groups. The first group comprises factors associated with personal attributes and characteristics of individual information seekers, such as existing knowledge and experience, or their professional roles. These factors are referred to as individual attributes in the next section of the review. The second group comprises factors associated with the environment invoked by the individual information seeker as context as a result of their salience and relevance to tasks being undertaken, such as aspects of the legal or political landscapes. These factors are referred to as contextual factors in the next section of the literature review.

Figure 2.2 Invoking context through a process of situation awareness



Note. The shaded area represents the environment in which human information behaviour takes place
[a] P, S, E, L and T represent political, social, environmental, legal and technological factors in that environment; the numbers represent different political or legal factors, for example.

This understanding of relationship between individual information seekers, their information seeking and use behaviour, and the contexts in which this behaviour occurs is indicative of a cognitive constructivist perspective, albeit an orientation more closely

aligned with the 'holistic cognitive viewpoint' (Talja et al 2005, p. 83), a kind of mid point between cognitive constructivism and collectivism.

2.5 Enough information through the lens of context: Revisiting the literature

This section revisits the literature on enough information and stopping behaviour examining research findings on enough information through the lens of the conceptual framework of *Figure 2.2* to tease out the factors that influenced assessments of enough information and to develop an understanding of *how* individual and contextual factors shape those assessments.

Of the studies that investigated enough information and/or stopping behaviour only one, Zach's exploratory investigation into the information seeking behaviour of arts administrators, set out to investigate influences on the determination of enough information. One of the research questions that scoped Zach's investigation sought to find out 'what factors (*stopping criteria*) influence administrators to determine they have 'enough' information to end the information seeking process' (Zach, 2005, p. 26). However, several of the other studies into enough information and stopping behaviour reported findings that shed some light on the relationships between the individual information seekers, the phenomena and the contexts in which they were investigated (Foster, 2004; Kuhlthau, 2004a; Prabha, et al., 2007). These studies are also included in this section of the review which revisits the findings on enough information and stopping behaviour to consider influences on judgements of enough information through the lens of context.

2.5.1 Attributes associated with the individual

One set of attributes were reported to play a role in assessments of enough information were associated with the individual information seeker. As noted in *Section 2.2: Assessments of enough information informed by decision theory*, one of the two primary influences on the determination of enough information reported by Zach was personal comfort with the amount of information gathered (Zach, 2002, p. 155). Although Zach

quoted one of the arts administrators who participated in her study as saying that he relied on ‘instinct’ (2002, p. 155) and reported that the administrators drew on their own experiences when seeking information, she did not discuss the role of experience in relation to either assessments of enough information or stopping criteria.

Affective responses formed one set of attributes associated with the individual found to play a role in assessments of enough information. Confidence, an affective response to the amount and type of information gathered, was reported by several researchers. The boredom experienced by the young web surfers studied by Agosto (2002) as well as by students and academics (Mansourian and Ford, 2007) was another affective response that signalled an end to information seeking.

2.5.2 Contextual factors

A second set of factors reported in the literature as shaping judgements of enough information were associated with the context within which information seeking and judgements of enough information occurred. Tasks both trigger and then subsequently shape information seeking behaviour (Kuhlthau, 2004a, p. 196) and characteristics of tasks such as degree of complexity have been shown to influence choices made throughout the process of seeking and using information (Algon, 1999; Bystrom and Jarvelin, 1995). Task was also important in the assessment of enough information. Zach reported that the comfort felt by arts administrators was balanced against the time available for the task and interacted with a third factor, the administrators’ perceptions of the relative importance to the organisations of the tasks which had triggered the information seeking.

Other cues associated with tasks appeared in the form of meeting the information need that triggered the information seeking. Students studied by Prabha et al (2007) stopped seeking information when they felt they had answered the questions, and researchers when they felt they have representative coverage of the topic. These findings paralleled those of Zach (2002) who reported arts administrators also determined enough information against the nature of the decision they need to make.

An explicit focus on the relationship between 'core processes, contexts and behaviours' (Foster, 2004, p. 229) shaped Foster's study of the information seeking behaviour of academics working across multiple disciplines. Foster (2004, p. 232) identified factors external to the individual, described as either social or organisational factors, that influenced each of the three core information seeking processes. Networking in the form of dialogue with colleagues was a feature of both the opening and the consolidation categories. It was during consolidation that 'knowing enough' appeared as a core process. This kind of collegiate dialogue and feedback also featured in the findings of Prabha et al (2007, p. 83) who reported that academics relied on feedback from colleagues and journal reviewers as a cue to stop their information seeking. Time in the form of time available or self-imposed time limits (Agosto, 2001; Mansourian and Ford, 2007) was another feature of the environment invoked when making assessments of enough information.

2.5.3 Informational factors

Beyond attributes associated with the individual such as comfort and confidence and factors invoked as context such as the importance of the task, a third set of cues was identified in previous studies as playing a role in assessments of enough information and stopping behaviour. These cues are to do with the information itself and included redundancy of information (Kuhlthau, 2004a, p. 50) and currency of information sources (Prabha, et al., 2007, p. 83). The security analyst studied by Kuhlthau (1997) informational attributes in a different way. His assessment of enough information was shaped by a ' "trigger" of having valuable new information' (2004a, p. 172) to present to his clients. Other information-related cues were the accuracy of information (Prabha, et al., 2007), the amount of information (Zach, 2002) and diminishing relevance in the information found (Kuhlthau, 2004a; Zach, 2002).

Revisiting the empirical findings on enough information and stopping behaviour through the lens of context has revealed a series of complex inter-relationships between individual information seekers, contextual factors and the information gathered. What became apparent during this examination of existing knowledge on enough information and stopping behaviour was that, although consistency is emerging on a common set of cues or signals that are important in aiding judgements of enough information and

decisions to stop seeking information, the field does not yet have a framework for understanding the contextualised process through which people call on these cues when making judgements of enough information.

Chapter Conclusion

Only a small number of human information behaviour studies have illuminated the intertwined phenomena of enough information and stopping behaviour although a surge of interest in enough information and stopping behaviour (Agosto, 2001; Parker, 2006; Prabha, et al., 2007; Zach, 2002) is evident since 2000. Only two studies reported findings on enough information made during work-based information seeking. No studies have focused solely on the judgement of enough information. This situation suggests that despite some emerging consistency in findings there is still much that remains unclear about judgements of enough information made during work-based information seeking and use.

This literature review has revealed that these attempts to understand search closure, enough information and stopping behaviour have investigated different aspects of the phenomenon of enough information from various research perspectives. Two researchers (Limberg, 1999; Parker, 2006) explored how different groups of people have determined that they have enough information. Other researchers (Agosto, 2001; Prabha, et al., 2007; Zach, 2002) drew on decision theory, in particular, bounded rationality, satisficing and heuristics identify a number of stop rules or criteria used to decide if the information to hand is 'good enough' and it was time to stop seeking more information.

Despite the variety in research approaches, several themes were evident in the empirical findings about judging enough information and stopping behaviour. These themes included time available for information seeking or task completion and cognitive limitations resulting in information overload; affective responses of increasing certainty and confidence in being able to justify an argument or present a case; increasing redundancy in the information located; and a sense of having integrated new information into existing knowledge structures, or of having put together a complete picture or solved a puzzle. Although the research reviewed in this chapter has identified

a number of the criteria used to signal either enough information or a close to information seeking, there is still much to know about the relationship between the overlapping and interlinked phenomena of enough information and stopping behaviour.

Although drawing on the literature of human judgement and decision making, only one of the four researchers explicitly defined the decision she was investigating. The classical definition of a decision as the choice between two or more options for action originated in the field of optimal decision making and remains widely used across a number of disciplines (Yates, et al., 2003, p. 15). The decision maker is faced with alternatives, forms expectations about likely outcomes and assesses the consequences of choosing each of those alternatives (Hastie and Dawes, 2001, p. 25). Definitions of this kind have been widely used in the human information behaviour literature. In empirical research Agosto for example operationalised the decision as the choice of website to meet the information needs of the research participants in her investigation into web searching behaviour. This classical definition has also been used in review publications (Case, 2002).

An interest in the signals that acted as cues to stop seeking information featured in three studies into enough information and/or stopping behaviour (Mansourian and Ford, 2007; Prabha, et al., 2007; Zach, 2002). Both Zach and Prabha et al described these phenomena in ways that suggested they saw the cues as closely linked to the determination of enough information. Prabha et al focused on knowing when to stop but recognised that this had to with enough information to meet the information need (2007, p. 81). Zach made an explicit link between enough information as a signal to end information seeking (Zach, 2002, p. 8) and saw it clearly related to stopping criteria. Mansourian and Ford (2007, p. 684) recognised the question of when to stop searching as a search-related decision. However none of these three studies explicitly defined the relationship between enough information and stopping behaviour.

As a result of this lack of clarity, the nature of the relationships between the phenomena being studied, that is, enough information, and the related phenomenon of stopping behaviour, has remained unclear. The findings suggested that for many researchers the concept of enough information was inextricably entangled with the decision to stop

seeking information and this was particularly evident in the research that drew on human judgement and decision making as a framework.

Related to this lack of clarity around the nature of the two phenomena are concerns about the adequacy of behavioural decision theory to fully explain enough information and stopping behaviour. The focus of the previous research has been on identifying *what* cues are used in judgements of enough information. Few of the studies have revealed *how* these cues shape judgements of enough information. As a result a deep understanding is missing of the mutually recursive interactions between people seeking and assessing enough information to complete tasks and the settings in which they carry out those tasks, and the factors that influence their judgements of enough information.

As more is learnt about what cues are important in assessing enough information, two important questions remain unanswered:

- *How* do people make judgements that they have enough information?
- *How* are those judgements shaped by individual attributes such as experience, or contextual factors such as task importance?

The overall aim of the thesis was a deeper understanding of the concept of enough information in the workplace. In light of the gaps identified in the literature review, two research questions were developed to define the scope of the empirical study that underpins the thesis.

Research Question 1:

What do workers understand to be enough information? How do they determine that they have enough information to complete work tasks?

Mindful of the importance of context in shaping human information behaviour, the second research question focused on the factors that influenced the assessment of enough information, with a particular interest in the processes through which this influencing occurred:

Research Question 2:

What influences shape workers' assessments of enough information? How do these influences shape assessments of enough information?

Guided by the methodological challenges associated with studying information seeking and use behaviour in context, the next two chapters describe and justify the methodological orientation and the research design, selected for the empirical study that addressed the two research questions.

Chapter 3

Researching the judgement of enough information: Methodological considerations

The previous chapter laid the theoretical foundations for the research questions addressed in the thesis. The overall purpose of the thesis was to develop a deeper understanding of how, in an information-rich environment, people assess they have enough information to complete a work task. The research also explicitly sought insights into the nature of the influences on assessments of enough information, and into how those influences shaped assessments of enough information. The research problem tackled in this thesis was framed as the interaction between the judgements of enough information made by individual information seekers and the factors that influenced how information seekers made those judgements.

The review of the literature revealed the development and expansion of epistemological approaches to understanding human information behaviour since the 1980s. This expansion was in part a response to the perceived limitations of experimental and normative studies to fully explain the complex and multidimensional activity that is human information behaviour. The broadening of the field's research repertoire was also in part a reflection of the different ways through which human information behaviour researchers themselves view and understand the worlds in which they carry out their investigations. Despite this accepted diversity of approaches for investigating human information behaviour, the methodological choices made for this study needed to be acceptable to scholars in this field of study, in order to affirm the 'legitimacy' of the study findings and so expand the field's knowledge (Dunkin, 2000, p. 137). This chapter provides the rationale for the methodological choices made for the empirical study which underpinned the thesis as a first step in establishing the legitimacy of the study findings.

In this chapter, firstly, the methodological orientations used by human information behaviour researchers in general are reviewed and those frameworks used previously to

study either enough information and/or stopping behaviour in particular are examined to assess benefits and disadvantages associated with each framework. Secondly, the methodological orientation of the empirical study is explained. Thirdly, possible research approaches appropriate for a study of this nature are canvassed. Fourth and finally, the choice of case study as the overall research approach is examined and justified. The choices considered and the decisions made at this stage of the research were informed by social science research approaches (e.g. Creswell, 1998; Flyvbjerg, 2004; Patton, 2002; Stake, 1995) as well as those of the field of human information behaviour (e.g. Bates, 2005; Dervin, 1997; Fidel, 1992).

3.1 Researching human information behaviour

Before investigating possible methodological orientations for the study, an overview of the methodological approaches of human information behaviour research is provided. Against the backdrop of the overview, insights gained from previous studies into enough information and/or stopping behaviour are considered.

This thesis is framed by a theoretical perspective which situates human information behaviour in context. As noted in the introduction to this chapter, the 'conceptual leap' of the 1980s (Dervin and Nilan, 1986, p. 24) saw the attention of the field broaden from an earlier focus on information systems and resources and how they were used (Dervin and Nilan, 1986, p. 6) to encompass acknowledgement of information users and the contexts in which they seek and use information.

The field of human information behaviour research is characterised by strong debate on a range of theoretical and methodological issues (see, for example Dervin, 1997; Jarvelin and Ingwersen, 2004; Vakkari, 1997), and is currently seen as being in a 'theory building phase' (Kuhlthau, 2004a, p. xv). With the field in this state of evolution, there is a diversity of ideas about the most appropriate and useful research approaches to understanding human information behaviour. This situation is healthy, in keeping with Lincoln and Guba's call to avoid 'the constitution of a neo-orthodoxy' in research endeavours (1985, p. 330). However, it has also led to tension in the field of human information behaviour, tension between the different approaches to

understanding how people seek and use information. Using a curtain as a metaphor to better explain this tension, Ford (2000, p. 625) posits two ways of seeking new understandings of phenomena under study. One view is as though through scattered pinpricks in a heavy, opaque curtain – offering a clear but necessarily narrow view of the phenomena under study. Alternatively, a researcher can view the object of study as through a gauze curtain, offering a hazy and only vaguely delineated view which reveals complex, inter-connected shapes but without the clear detail of the alternate view. Both perspectives reveal something about the phenomena and either may be appropriate in different circumstances.

In a field such as human information behaviour in context, where the full map of the landscape is yet to be charted, the gauze curtain approach would appear to better serve the researcher, allowing her to sketch in the most important features of the landscape, before narrowing down a focus for future research efforts. Without these features being mapped, the relationships between them (necessary information before taking a deep, clear but narrow view of the phenomenon) are neither established nor understood. As an example of how understanding may be distorted when attention focuses prematurely on factors which seem important to the researcher, Allen and Kim (2000) acknowledged that their focus on cognitive styles and abilities necessarily overshadowed the possible role of affective factors in the information seeking behaviour of the participants in their study.

The selection of both methodological orientation, and research approach and design is important in all research endeavours. Methodological positions or orientation should guide the choice of research methods, or approaches. Further, rigorous attention to a tight alignment between methodological orientation and research design is an important strategy for increasing the overall trustworthiness of the research (Lincoln and Guba, 1985, p. 290). When working in a field characterised by diversity of approaches and in which researchers draw on diverse theoretical and methodological backgrounds, it is even more important that careful consideration be given to the appropriateness of the choices made, and subsequently, to the congruence between the overall methodological approach and the design of the study.

The following section summarises the methodological orientations and research approaches used previously to find out about enough information and stopping behaviour. The research findings themselves were discussed in more detail in Chapter 2; the following analysis focuses on the methodological issues associated these studies.

3.1.1 Previous investigations into judgements and decisions during information seeking

Early studies (e.g. Kantor, 1987; Morehead and Rouse, 1982) focused on the decision to stop seeking information and were conducted under the umbrella of the positivist or 'systems-centred' paradigm (Talja, et al., 1999, p. 751). They were theoretical and experimental studies, usually framed within theories of optimal decision making (discussed in *Section 2.2 Understandings of enough information informed by decision theory*), often with a particular focus on information searches in databases and conducted in laboratory settings.

While these studies offered insights into the decision to stop searching for more information, the understanding they afforded was limited. The laboratory-based experiments and mathematic modelling were far removed from the real world context in which real human decision activity takes place (Case, 2002; O'Reilly, 1982). As one example, the laboratory experiments limited the amount of choice made available to study participants. However evidence is emerging that choice can, in fact, be overwhelming, and may therefore be de-motivating for those choosing (e.g. Rosenthal, 2006; Schwartz, 2004), a finding reflected in the conclusion of Allen and Kim (2000, p. 13) that the lack of motivation to complete an experimental task in a laboratory setting may account for their inconclusive findings. Experimental studies also excluded the possibility of participants receiving and acting on feedback during the information search process.

Using an artificial setting and quantitative methods and measures, researchers who conducted experimental and laboratory studies ran the risk of oversimplifying what was happening as people made decisions about stopping or continuing their search. Researchers may also have missed important factors influencing the behaviour of information seekers because those factors could not be measured or quantified. Further,

they were unable to assess the whole experience of the phenomenon under study (Patton, 2002, p. 58), in this instance the experience of assessing enough information during information seeking. These features of the research limited the generalisability of findings to real world settings in which people seek and use information and caution should be used in drawing implications from the findings.

By contrast more recent research came at the problem of understanding enough information and/or stopping behaviour from a different epistemological perspective, employing naturalistic and interpretive approaches, and qualitative methods and techniques to draw out the complexities of contextualised judgement and decision making during information seeking. The importance of the assessment of enough information emerged from a series of studies undertaken by Kuhlthau (2004a) into information seeking behaviour of high school students, library users, a security analyst and lawyers. These studies were conducted using a variety of methods in a variety of settings, including longitudinal studies, and exploratory research drawing on data gathered using semi-structured interviews. Limberg (1999), also using an interpretive and naturalistic approach to studying the information seeking and learning of high school students, one dimension of which was the students' conceptualisations of enough. Limberg used a phenomenographic approach (evaluated in more detail in *Section 3.3.2 Phenomenography*) as she sought to capture the variation of that experience of enough information. The importance of enough as both a brake and as a generative driver to seek more information emerged in Parker's (2006) investigation into the assignment information process, also conducted as a phenomenographic study.

Three other studies sought to understand enough information and/or stopping behaviour through the use of what was described by the researchers as a qualitative methodology, all three drawing on Simon's (1997) theories of bounded rationality and satisficing and the concept of stopping rules. Each of the studies employed what was described by the researchers as a qualitative methodology. One study took a multiple case study approach to map the information seeking behaviour of senior arts administrators (Zach, 2002). The second used a mixed methods approach, comprising questionnaires, sessions in a computer lab and group interviews, to study information seeking on the web

(Agosto, 2001). The third (Prabha, et al., 2007) elicited data on satisficing behaviour of students and academics through focus group interviews.

The different methods and approaches outlined in this brief summary of the research into the enough information and/or stopping behaviour demonstrates that scholars investigating this aspect of human information behaviour have drawn on diverse perspectives and methods in their investigations into the concept of enough information and the decision to stop or continue looking for more information. The more recent studies suggest that naturalistic and interpretive approaches are appropriate for research into human information behaviour in context.

3.2 Methodological orientation of the study

The research questions that guided the study sought responses to questions such as 'what is happening here? what patterns or themes are apparent?'. Research questions of this nature are indicative of inquiry into a little understood phenomenon (Marshall and Rossman, 1999, p. 33; Patton, 2002, p. 193) confirming the thesis research as an exploratory study and reinforcing the alignment of the study with the metaphor of the gauze curtain.

The research questions revealed an interest in studying the phenomenon of enough information as a judgement made by people in a real workplace, rather than an interest in testing hypotheses about that phenomenon. Because the study sought an in-depth and nuanced understanding of an information phenomenon – that is, how people assessed they had enough information for the work task in hand and decided to stop seeking more – the researcher felt she could only understand the information seeking and use behaviour of workers and the influences on the judgement of enough information if she studied that behaviour within the context in which it took place. The aims of the study therefore suggested a naturalistic approach was appropriate, an approach that would facilitate an understanding of the participants' real world experiences of assessing enough information as they sought and used information to complete tasks.

Studies undertaken with a naturalistic orientation position the research as 'discovery-oriented' (Guba, 1978, quoted in Patton, 2002, p. 39), a 'set of interpretative, material practices that make the world visible' (Denzin and Lincoln, 2000, p. 3). Stake described three dimensions of this world made visible (1995, p. 100):

- the external, physical reality, in this study, the organisational settings in which workers carried out their information seeking and use activities
- the researcher's own and individual interpretation of this external reality
- the 'universe of integrated interpretations', a universe of knowledge that will be augmented by findings from this study.

As a further guide to the methodological positioning of this thesis, Tesch's framework for qualitative research is used. The study is positioned in this framework as an understanding of an action (Tesch, 1990, p. 60), or event, that is, the judgement of enough information, which required an interpretation of both how the individual participants assessed they had enough information and how contextual factors influenced that assessment (Tesch, 1990, p. 67).

In taking an interpretive approach, the researcher acknowledges that she does not aspire to discover any external reality but rather to fashion a clearer understanding of her own interpretation of the external physical world. In sharing this interpretation she is also contributing new knowledge to the collected interpretations of enough information and/or stopping behaviour held by scholars in the field of human information behaviour. The interpretivist approach not only accepts that multiple perspectives exist, but further argues that this is beneficial as this situation can be a 'creative source of new knowledge' (Metcalfe, 2005, para. 2). The implications for the thesis research of this interpretive stance are that the design of the empirical study, in particular, the techniques for data gathering and analysis, should aim to facilitate the drawing out of the multiple perspectives.

Emerging from the literature review reported in Chapter 2 and the positioning of the study as naturalistic and interpretive, four inter-related issues arose that had further implications for the research design adopted for this study. Firstly, although human

information behaviour researchers have recognised the need to develop 'context-dependent knowledge' (Flyvbjerg, 2004, p. 421), the field continues to use a number of different terms to describe context, and to designate that which falls outside the individual. Secondly, and related to the acknowledgement that in context is found the 'basic motivation and impetus' that triggers information seeking (Kuhlthau, 1999a, p. 10) is debate about the nature of the relationship between research participants and the contexts in which they seek and use information. Thirdly, beyond the relationship between participants and contexts, is the nature of the relationship between researchers and the phenomena they study and the settings in which phenomena are studied. A fourth issue which surfaced during the literature review, the invisibility of information seeking in the workplace, also presented a particular challenge for the practical implementation of the research.

The first issue, of how to conceptualise the inter-relationship between the individual and the contexts in which she seeks and uses information, was examined in detail in *Section 2.4: Enough information in context*. The fourth issue, the invisibility of information seeking in the workplace, is dealt with in detail in *Section 4.1: Research challenges encountered*. The next two sections examine in more detail the implications for the study of the second and third issues:

- implications for researchers of the dynamic nature of the relationship between people and the contexts in which they seek and use information
- the nature of the relationship between researcher and the research interest.

3.2.1 Relationship between people and contexts

The review of the literature on enough information and/or stopping behaviour revealed widespread agreement that the field of human information behaviour is complex. This complexity demands methodological approaches and research designs able to accommodate it.

Much human information behaviour research has been situated either in the psychological or the sociological domains (Fidel, et al., 2004, p. 941). For example, a number of scholars have positioned information seeking as a cognitive activity (e.g.

Belkin, 1984; Ingwersen, 1996), and have focused their attention on, for example, the role of cognitive style in shaping human information behaviour (e.g. Allen and Kim, 2000). More recently, the role of affect in information seeking is emerging as an important factor in human information behaviour (Nahl and Bilal, 2007) as researchers have sought to understand how this psychological dimension might influence information seeking (Nahl, 2007). Other researchers have examined the social dimensions of information seeking (e.g. Chatman, 2000; Leckie and Pettigrew, 1997). Still other researchers have focused on one aspect or factor of information seeking behaviour felt to be important, for example, investigations into the interactions between task and information seeking (e.g. Bystrom and Jarvelin, 1995; Vakkari, 2002).

Other studies into information seeking and use behaviour have focused on a small number of factors identified pre-study. In part this focusing of attention is related to the research questions that scope the studies and may also be a pragmatic response to the complexity of the field. However a focus on one or two factors may constrain researchers and limit their understanding of the nuances and the inter-relationships at play (Fidel, et al., 2004, p. 939). Acknowledging this need for a more holistic understanding of human information behaviour, researchers are using different approaches such as ethnography (e.g. Anderson, 2003) or cognitive work analysis (e.g. Fidel and Pejtersen, 2004) in their efforts to fully understand human information behaviour and there is growing support for a multi-dimensional approach to understanding human information behaviour (e.g. Fidel, et al., 2004; Savolainen, 1995; Sonnenwald and Pierce, 2000).

Although this study was bounded in one sense by a focus on a single phenomenon, that is, the judgement of enough information, it was far from clear which factors were likely to be important in shaping judgements of enough information in the workplace. An understanding of human information behaviour in the workplace as a phenomenon occurring in a social setting, together with consideration of the contextual issues, discussed in *Section 3.1 Researching human information behaviour* and earlier in this section suggested the need for a research approach that sees ‘the whole […] as a complex system that is greater than the sum of its parts’ (Patton, 2002, p. 59). As a result one of the criterion used in choosing a research design for the empirical study was

that the design should not require pre-determining which factors were to be investigated. Instead the design should allow for those factors important to the study participants in their real-world assessments of enough information to emerge.

3.2.2 Relationship between researcher and research interest

The interpretive approach foregrounds the issue of the interdependent nature of the relationship between the researcher and the research participants, settings and phenomena they choose to study. Accepting that participants and contexts mutually influence each other, the argument can be put that the researcher too by paying attention to particular phenomena, plays a role in invoking context for her study. This relationship was highlighted by Talja et al, (1999) when they argued that researchers choose particular research approaches to study particular people at particular times carrying out particular activities. By making this series of choices, researchers are creating the 'contextual entities' (Talja, et al., 1999, p. 754) in which the study will take place.

Acknowledging that researchers call into existence both the phenomena and the contexts they study, they still need to be able to write about them, to make visible the phenomena they are studying in such a way that they can converse with others who are working in similar fields. This is not to claim that the names or labels used to describe phenomena are completely objective`. Since any 'representational device' such as a name or a label is a 'piece of craftwork' (Suchman, 1995, p. 5), they must accept that the 'worded world' (Richardson, 2003, p. 499) they create is not a replica of the studied world. This relationship illuminates the issue of researcher bias which is arguably present in all research undertakings.

A further layer of complexity is added by the knowledge that participants will choose which self or selves to reveal to the researcher (Lincoln and Guba, 1985, p. 95). Feeding into this selection of which self to reveal is the tendency for research participants to attempt to work out what framework is being used by the researcher when formulating responses to questions (Foddy, 1993, p. 70). Thus, in an interpretive study, it is not only the participant who is drawing on context to understand and report what is going

on. The researcher too has an active role in the construction of meaning based on the data gathered.

3.2.3 Implications for the study

The concerns discussed in this section required that the selected methodological orientation and research approach be appropriate to and congruent with the exploratory nature of an investigation into a little-understood phenomenon. The review of previous investigations into the related phenomena of enough information and stopping behaviour confirmed the benefits of situating the empirical study that underpinned the thesis as a naturalistic inquiry.

In *Section 2.4: Enough information in context* several concepts were delineated that are key to understanding human information behaviour in this thesis: environment, context and situation. In one sense the definition that portrays context as 'anything that is not defined as the phenomenon of interest' (Dervin, 1997, p. 14) may not be far off the mark. Differentiating environment, all that exists beyond the individual, from context, salient elements in the environment, it is argued that the researcher cannot a priori define what individuals will constitute as contextual factors out of that broader environment. However, although contextual factors may not be specified a priori, the researcher, using the examples of Taylor (1991) and Lieurouw (2001), took the view that typical contexts for particular groups of people doing particular types of work may develop over time. In a particular setting of a particular study, certain environmental factors may be expected to be salient and to be constituted as context by the study participants.

In particular awareness of the complex inter-relationships among research participants, contexts, and the researcher suggested an holistic approach, an approach that allowed factors important to participants to emerge. Such an approach would be likely to facilitate the eliciting of multiple perspectives on the phenomenon of the judgement of enough information.

Recognition of the interrelationships between people and contexts, and between researcher and research interest further strengthened the argument for an holistic

approach to understanding human information behaviour, since not only do people seek information in a social context, they also construct meanings within and drawing on this social context. A final and compelling reason for a holistic approach is that this is how individuals themselves view the activity of information seeking (Kuhlthau, 2004a, p. 4).

Accepting the understandings of the relationships among researcher, researched and the context in which research is conducted as portrayed in *Sections 2.5 Influences on enough information* and *3.1 Researching human information behaviour*, there were two major implications for this study. Firstly, the nature of the relationships between the individual and the context in which she is working, is a relationship of shaping and being shaped, and must be recognised and considered when choices are made about research methodologies, methods and techniques. Secondly, if it is the researcher who creates the context and, further, who 'constitutes the meanings' (Talja, et al., 1999, p. 755) to be reported, we must acknowledge that we may describe and interpret the behaviours we study but must do away with any claim to be reporting an independent, objective reality.

Appropriately addressing these concerns in the study required an approach that allowed the participants to determine what was important about their judgements of enough information, and allowed the role of a range of individual and contextual factors in shaping judgements of enough information to emerge. *Section 2.4: Enough information in context* concluded with a positioning of previous studies into enough information within the meta-theoretical framework proposed by Talja et al (2005). The overview in Section 2.4 revealed a variety of approaches in the previous studies into enough information. The point of departure for the empirical study aligns with the collectivist approach described by Talja et al. In short, the study needed an holistic approach to allow participants' different understandings of the phenomenon of the judgement of enough information to emerge. Such an approach would encourage participants to recall and re-tell their experiences of information seeking, use and stopping from as many different perspectives as were meaningful to them.

These factors – the significance and the role of context in understanding human information behaviour, the nature of the relationship between participants and contexts,

between researcher and researched and the value of investigating a little-understood phenomenon in an holistic way – guided methodological and design choices for the study.

3.3 Potential research approaches

Given the naturalistic orientation and the interpretive approach to understanding the phenomenon of enough information, the next question was: what research approaches were available and appropriate to the type of research being planned? Three research approaches were considered. *Table 3.1* summarises the alignment of research aim and research questions, methodological orientation, the type of research and three research approaches considered. In this section, two research approaches that were considered but discarded are discussed. The selected approach, a multiple case study, is discussed in *Section 3.4: Case study*.

Table 3.1 Aligning the research: From aims to methods

Research Aim	Research Paradigm	Research Questions	Research Type	Research Methodology	Research Methods Considered
Seeking understanding of a social phenomenon	Interpretivist	What … ? How …?	Exploratory	Qualitative	Ethnography Phenomenography Multiple case study

Note. Table based on Pickard, (2007, p. xv)

3.3.1 Ethnography

An ethnographic approach suggested itself during the early stages of framing the research. Ethnography aims to develop an 'understanding of cultures' as experienced and understood by the people 'who have been socialized into them' (Edwards, 1995, p. 28), and so appeared to meet the expressed need to accommodate the possible role of contextual factors in shaping judgements of enough information. Ethnographers study members of a community in their natural setting, using a range of techniques, with the researcher sometimes positioning themselves as participants in the research but always seeking to see and describe the world from the native or insider perspectives. Because

of this requirement, an ethnographic approach demands immersion in the culture of communities (Hirsch and Gellner, 2001, p. 7). This latter characteristic is one of the key differentiating features of ethnography, distinguishing this approach, for example, from case study research which does not require the researcher's immersion in the study setting.

The study was initially conceived as an examination of people and information seeking activities. The researcher was interested in the making of judgements of enough information in organisational contexts and shaped by both internal and external influences. In particular the researcher was interested in the inter-relationships of these factors. This conception of the study shared traits with ethnographic studies which investigate events and experiences within contexts (Tedlock, 2000 p. 455). Since the aspirations of the study were to 'reflect the polyphony of the real world and to 'contextualise its findings' (Hirsch and Gellner, 2001, p. 9), this approach to understanding people and their worlds appeared an appropriate way to investigate and understand in an holistic fashion the information seeking and use behaviour of workers, their judgements of enough information as well as the influences on that behaviour.

Ethnography also met the criteria of being acceptable to scholars in the field of human information behaviour. Ethnographic studies are part of the human information behaviour research landscape (e.g. Anderson, 2003; Chatman, 1991; Solomon, 1997b). Sandstrom and Sandstrom (1995, p. 162) have been critical of many of the studies, arguing that many studies use the methods in an 'unscientific' (1995, p. 163) way. A further concern was that a number of researchers appear to equate ethnographic research with qualitative or naturalistic research.

In the end, however, it became apparent that an ethnographic approach was less appropriate to the study underpinning the thesis because the study's focus was less on the cultural aspects of the workplace *per se*. Rather the interest in culture was only one part of a broader interest in the ways in which cultural factors might influence judgements of enough information. Practical challenges also face the prospective ethnographer. Ethnographic research requires a substantial investment of time, both in the field but also in training and skills development for the researcher (Sandstrom, 2004,

p. 14). The time likely to be required was not available to the researcher in the context of her candidature.

While an ethnographic approach certainly permitted a holistic approach to understanding people in their worlds, the thesis was tightly focused on just one aspect of their information seeking and use, the judgement of enough information. Investigating and understanding this particular aspect of the information seeking process did not require full immersion in the culture of the workplaces in which the study would take place.

3.3.2 Phenomenography

As the scope of the research was refined the focus narrowed to one aspect of information seeking and use, and a single phenomenon – the judgment of enough information. With this focus on one phenomenon and with the research interest in understanding how study participants experienced this phenomenon, it appeared that a phenomenographic approach might also be appropriate.

Phenomenography seeks to record the 'qualitatively different ways in which people experience or think about' various aspects of the world around them (Marton, 1988, p. 179). Twin hallmarks of phenomenographic research are firstly, an interest in the experiences of participants and secondly, the attempt to draw out the range of variation in those experiences, that is, an interest in the difference between participants' experiences of the phenomenon (Bowden, 2000, p. 15) with the overall aim of providing a rich and comprehensive description of those experiences. Researchers who have used a phenomenographic approach have likened phenomenography to a way of 'investigat[ing] the collective consciousness' of a group (Bruce, et al., 2004, p. 221), arguing that it helps get beyond the individual experience to a map of the whole range of experiences of participants in the research.

Two assumptions congruent with assumptions underpinning this thesis, and indeed, much of the current research in the field of information seeking and use in context, also underpin phenomenographic research. These assumptions are that people experience the world differently and that this experience is shaped by contextual factors. MacKenzie

(2003, p. 80) describes this experience as ‘relational’ in two ways. One aspect of this relational nature of human experience acknowledges that people see and experience situations differently and will therefore foreground different dimensions of the phenomena being studied. The second aspect is reflected in the sense that the experience is constituted as part of the relationship between the individual and the world around her/him. This phenomenographic understanding of experience as the ‘internal relationship between humans and the world’ (Marton and Pang, 1999, p. 1), was in line with the way in which this researcher viewed both the individual and the context in which she/he works, and also the relationships between the individual and context.

With its attention to the mapping the range of individual experience and the relationships with context, phenomenography as a methodology appeared an appropriate approach for developing a deeper understanding of judgements of enough information. The methodology is not however, without its critics. Specifically related to phenomenography is the criticism that phenomenographic approaches reduce ‘the voice of the individual’ (Bowden, 2000, p. 1) as findings are presented solely as the shared experiences of all participants. Bowden (2000, p. 16) acknowledges this denial but argues that phenomenography does not have the stated aim of faithfully representing the individual’s conception, but rather it seeks to map the range of variation in the experiences of a number of individuals.

Several other criticisms of phenomenography such as a lack of validity, a lack of predictive power and the risk of researcher bias (Bowden, 2000, pp. 1-2) are criticisms that have been levelled against naturalistic research in general. A further criticism of phenomenography is the challenge to the assumption that, if participants, as they respond to questions, focus on a particular aspect of the phenomenon under study, then the researcher can be confident that that aspect represents the ‘salient features’ of the phenomenon for that participant (Patrick, 2000, p. 121). Again this is an issue with all naturalistic inquiry in that the researcher, by asking questions in a particular way about particular aspects of participants’ experiences is signalling her interest in these aspects.

In summary phenomenographic studies seek to draw out data on how people experience phenomena, taking a holistic approach by allowing participants to determine which

aspects are foregrounded, with the researcher then mapping the different kinds of experiences across the participants. Further, phenomenographic researchers acknowledge the importance of context in the formulation of conceptualisations of phenomena, offering a way to advance the interest of human information behaviour researchers in acknowledging the interplay of user and context.

Because of these characteristics a phenomenographic approach was seen as an appropriate methodology for this study into the nature of judgments of enough information and the relationships between contextual factors and those judgments. However, since the focus of the study was on finding commonality in the participants' judgements of enough information rather than mapping the variation in those experiences, a defining characteristic of phenomenographic research, it was decided not to pursue this research approach.

3.4 Case study: The selected research approach

Case study is a research approach that explicitly emphasises the interplay and inter-relationships between people and the context in which they act (Case, 2002, p. 179). Case study is:

- appropriate for exploratory research (Neuman, 2003, p. 31)
- appropriate for interpretive studies (Lincoln and Guba, 1985, p. 188)
- characterised by its flexibility and emergent design
- appropriate when there are a large number of factors influencing what is happening but it is unclear which of these factors are more important (Fidel, 1992, p. 37).

With its focus on the interplay of factors and seeking to create as complete an understanding of an event or situation as possible, case study is a way of understanding both difference and commonalities that are to be found human behaviour in real world settings (Stake, 1995, p.1). Because this was an exploratory study the focus was on commonality of experience rather than diversity. In spite of some challenges to the value of case study findings, the approach is used widely in social science research, including fields designated 'practice-oriented'. Further, the approach is acceptable to the

field of human information behaviour within which the thesis is situated (Case, 2002, p. 215), with the appropriateness of the case study approach for human information behaviour research put by Fidel (1992, p. 27) and an increasing number of examples of its use (e.g. Correia and Wilson, 2001; Kuhlthau, 1997; Meho and Haas, 2001; Zach, 2002) in generating new knowledge in the field.

Case study means different things to different people in different disciplines (Stake, 1995, p. 2) and the approach is used differently within different research traditions (Gillham, 2000, pp. 1-2; Stake, 1995, p. 2; Yin, 2002, pp. 14-5). As a consequence it is difficult to define this research approach in a comprehensive manner (Lincoln and Guba, 1985, p. 361). Case study research has been conducted within the positivist tradition (e.g. Yin, 2002) and with a naturalistic orientation (e.g. Fidel, 1992; Stake, 1995). Across both orientations, positivist and naturalistic, several common characteristics may be identified (Creswell, 1998, p. 61; Eisenhardt, 1989, p. 534; Fidel, 1992, p. 37; Stake, 1995, p. xi) with key features being:

- a focus on a single phenomenon, which may be studied in multiple real world settings
- a concern with understanding how the phenomenon being studied relates to the setting in which it is observed.

Case study researchers emphasise 'episodes of nuance, the sequentiality of happenings in context, the wholeness of the individual' (Stake, 1995, p. xii) seeking to reveal the problem, the context, issues that emerged and lessons learnt (Creswell, 1998, p. 36). Given the flexible nature of the approach, it is not surprising that there is little guidance on a standard methodological path. The following discussion on the challenges encountered in case study research draws primarily on those scholars working within the naturalistic and interpretive tradition, since this is the methodological orientation for this study.

3.4.1 Challenges in case study research

Three particular aspects of case study research presented challenges for the researcher in structuring the empirical study. One was the meaning of the concept of 'the case'. A

case can be ‘a specific, a complex, functioning thing’ (Stake, 1995, p. 2) or a ‘program, an event, an activity, or individuals’ (Creswell, 1998, p. 61), with Stake (1995, p. 2) suggesting, for example, that phenomena such as professional practice or the relationship between two phenomena are ‘less commonly considered a case’. Other researchers take a broader view, arguing a case can also be any ‘entity [including] decisions’ (Yin, 2002, p. 23).

The second challenge was related to the strengths of case study as a research strategy: its flexibility and variety (Creswell, 1998, p. 63). This flexibility is one reason why case study suits exploratory studies so well. A key assumption underpinning the approach is that case studies cannot be ‘rigorously planned’ because the nature of the case and the field setting will shape the study (Fidel, 1992, p. 37). These features necessarily mean that standardised approaches and tight definitions detract from the value of the approach. However a consequence of this flexibility was that meticulous attention was required to ensure the accurate and timely recording and justifying all decisions made as the empirical study unfolded.

A third challenge facing case study researchers is establishing the boundaries of the case under investigation (Creswell, 1998, p. 37). Attention to the context in which the case is studied and its relationship to the phenomenon under study is one of the hallmarks of case study research (Stake, 1995, p. 16), with that context potentially including ‘actors, connections, interactions, situations, processes and information’ (Case, 2002, p. 179). Cases may be bounded by time, by events, or by process (Creswell, 1998, p. 64). However, not all cases have clear and unambiguous start and end points (Creswell, 1998, p. 64) and boundaries are not always evident (Yin, 2002, p. 13). Case boundaries are difficult to determine because in real world settings, the phenomenon that is the case and the context in which it is found are not always easily distinguishable from each other (Gillham, 2000, p. 1). Nonetheless, Yin advocates using case study when the researcher ‘deliberately wants to cover contextual conditions’ (Yin, 2002, p. 13) as was the case in this research. As a first step towards managing the potentially overwhelming amount of data, planning for case study research, though inherently flexible, must include a definition of the case to be studied, along with its boundaries (Stake, 1995, p.

51). In this study, the case was defined as the judgement of enough information, made during work-based information seeking activities.

Working with an unusual case, a judgement, meant that there were few exemplar studies from which the researcher could learn and for a doctoral researcher the flexibility of case study research presented as both a positive and a negative factor. The flexibility of working with an emergent design meant the researcher could learn from the experience of designing and carrying out the research as it unfolded. However, this situation also created a state of ambiguity and uncertainty, stressful for the novice researcher but in itself also an important lesson in conducting naturalistic inquiry.

The researcher was also challenged by the need to clearly define and work within the boundaries of the case. Particularly during analysis she consistently found herself checking that the data was associated with the judgement of enough information rather than doing enough work or the state of knowing enough, for example. As noted earlier in the section, case boundaries can be difficult to establish. Practising the discipline of questioning 'is this about the judgement of enough information' throughout analysis and writing up the findings was an important skill developed during the research project.

3.4.2 Expanding knowledge from case study findings

Much of the criticism of case study as a research approach is related to how data are gathered and interpreted and how findings may be used. The approach has been challenged on the basis of its 'inherent subjectivity', and related to this, concerns have been raised about researcher bias and the generalisability of case study research findings (Fidel, 1992, p. 48). To this list, Yin (2002, p. 10-1) adds to the list concerns about a perceived lack of methodological rigour and about findings that are presented in such a way as to obscure rather than create new knowledge. Several points in this list are criticisms levelled against research with the interpretive tradition in general, that is, challenges to the theory, reliability and validity of case study findings.

Scholars who use the case study approach counter these criticisms in a number of ways. Case study is acknowledged as an ideographic interpretation (Bates, 2005, p. 9), interpreting and describing only what was understood by a particular researcher (or

team of researchers) in a particular setting. Fidel (1992, p. 37) argued that findings can be of 'relevance beyond the individual cases', with case study facilitating the development of 'more general theoretical statements about regularities in the observed phenomena'. This position is supported by Stake (1995, p. 85) who argues that 'people can learn much that is general from single cases'.

Findings from case studies work with the reader's own existing knowledge and experience, providing a platform for what Stake describes as a 'naturalistic basis for generalisation' (1995, p. 85). Case study findings become 'good raw material' (Stake, 1995, p. 102) for the reader, and it is up to the reader of such findings to make her own assessment of whether these findings may also be plausible or applicable in other similar settings (Lincoln and Guba, 1985, p. 189). Flyvbjerg (2004, p. 421) stepped back from the direct criticism, for example, about the inability to generalise from case study findings, to test the assumptions that lie behind the apparent demand for generalisation and to challenge the belief that *only* 'context-independent knowledge' is valuable, thereby adding further support to the arguments of Fidel and Stake. It is interesting to note that case study researchers such as Yin and Campbell, originally strongly associated with positivist research traditions, have moved beyond their earlier 'dogmatic' concerns (Campbell, 1975, p. 179) that the case study method lacked rigour, that researchers' biases would be introduced into the studies and that conclusions would be drawn from inadequate evidence.

Case study has its own rigor (Flyvbjerg, 2004, p. 428) with the comparative methods of analysis used in analysing and interpreting case study data forcing the researcher to make explicit and recognise her own biases (Eisenhardt, 1989, pp. 546-7). Several techniques for improving the overall trustworthiness of case study research findings were used in this research:

- preparing a detailed narrative of the case, that begins with a 'substantial body of uncontestable description' about the case, that is, material that anyone would have observed in that situation or that the reader could be expected to know already (Stake, 1995, p. 110)
- researching multiple cases (Yin, 2002, p. 46)

- using ‘multiple approaches in a single study’ - that is, triangulating, to seek out ‘additional interpretations’ (Stake, 1995, p. 114).

Another technique, member checking of draft findings as a tactic to improve ‘accuracy’ (Stake, 1995, p. 115), was not used in the study, for reasons that are fully explained in *Section 4.5: Quality of the study*.

Chapter Conclusion

The reviews of both the human information behaviour and human judgement and decision making literature and the methodological literature raised a number of issues with implications for the methodological orientation and research approach for the empirical study that underpinned the thesis. These issues were:

- the importance of context in understanding human information behaviour
- the interdependent processes of interplay between people and contexts
- the inter-relationships between researcher and the research interest.

Reviewing research approaches acceptable to scholars in the field of human information behaviour revealed few traditions in the field that privilege particular research approaches such as ethnography or phenomenography. Rather the field is characterised by diversity, a situation that presented the researcher with a number of choices.

Starting with the broad intent of the study, to explore the phenomenon of enough information in a real world setting, a naturalistic orientation and interpretive approach were selected as the most appropriate ways to gain deep insights into the phenomenon of enough information. Although three possible research approaches were considered, case study was chosen as the approach for the research design for three main reasons:

- the focus of the study was on a particular phenomenon, the judgement of enough information
- the flexibility and emergent design afforded by the case study approach was seen as particularly valuable when studying a little understood phenomenon

- the intent of the research to reveal commonality in experiences of enough information.

In keeping with the naturalistic approach, the nature of the research questions, and the use of case study, qualitative techniques for data gathering and an inductive approach to analysis were seen as being most appropriate to this empirical study. Qualitative research techniques are especially useful for research projects with the attributes of the object of this research: a complex and little understood phenomenon which can 'be approached only in context' (Morse and Richards, 2002, p. 43), that is, in its real world setting. The strategies and techniques used in the empirical study are discussed in detail in Chapter 4.

Chapter 4

Investigating judgements of enough information

This chapter shows how the theoretical and methodological concerns raised in Chapters Two and Three were translated into a practical research design for the study. The following topics are addressed:

1. A summary of the research challenges faced in designing a study to explore the phenomenon of enough information
2. Setting and participants
3. Data gathering approach
4. Data analysis strategies
5. The quality of the research.

4.1 Research challenges encountered

Beyond the methodological concerns considered in *Section 3.2: Methodological orientation of the study*, two additional research challenges were identified during the review of the literatures on human information behaviour and on research methodologies:

- the invisibility of information seeking in the workplace
- a desire to reduce the impact of the researcher.

Most workers do not see information seeking as a discrete and immediately identifiable activity (Solomon, 1997b, p.292; Zach, 2002, p. 195). Rather, information seeking in the workplace is closely associated with the tasks in which it is embedded (Bystrom and Jarvelin, 1995, p. 192; Vakkari, 1999, p. 822). Because of this characteristic, it was important to develop a research design and techniques that would help overcome this invisible nature of information seeking at work.

In an interpretive study, particular demands are placed on the researcher. The researcher becomes the research instrument (Lincoln and Guba, 1985, p.187). She needs to able to see the world through the eyes of participants as well as be able to communicate her understanding of that world back to them (Erlandson, et al., 1993, p. 25). As observed in *Section 3.2: Methodological orientation of the study*, this situation necessarily sees the researcher take an active role in the construction of the meanings that become the research findings. However, the nature of the relationship between researcher, participants and the information they contribute has implications for the research design. Participants may seek, for example, to provide responses they believe are sought by the researcher (Foddy, 1993, p.54). It is important that researchers firstly, acknowledge this inter-relationship and secondly, seek to minimise its impact on the research findings by building into their research design strategies and checks aimed at increasing the overall trustworthiness of the research. The strategies used in this study are described in *Section 4.5: Quality of the Study*.

The choices made on how to structure the empirical case study were guided by the challenges of addressing these issues. In summary, addressing these challenges required a research design that would:

- offer an holistic approach to understanding the phenomenon of enough information
- reduce the impact of the invisibility of work-based information seeking on elicitation and data gathering
- minimise the impact of the researcher in shaping the research outcomes.

4.1.1 Research design: Multiple case study

The research was designed as a multiple case study. The justification for the choice of case study is provided in *Section 3.4: Case study*. The characteristics of the case study approach that make it an appropriate choice for this study are summarised below for the convenience of the reader:

- examines a ‘focused and bounded phenomenon embedded in its context’ (Miles and Huberman, 1994, p. 10)
- is appropriate for exploratory, descriptive and interpretive studies (Lincoln and Guba, 1985, p. 189; Neuman, 2003, p. 31; Yin, 2002, p. 3)

- is appropriate when there are a large number of factors influencing what is happening but it is unclear which of those factors are more important (Fidel, 1992, p. 37)
- permits the 'emergent design' advocated by (Lincoln and Guba, 1985, p. 210) for research with a naturalistic orientation
- has been used extensively in information behaviour research since the 1980s (Zach, 2002, p. 32).

In this study, the case was defined as the judgment of enough information made by one policy and research worker. The case was a single unit of analysis which was examined in multiple cases (Yin, 2002, p. 40). Much case study research focuses on a single case (Creswell, 1998, p. 39), suggesting at first glance the thesis study should have been confined to a single judgement of enough information studied in-depth. However the value of different types of case study including cumulative or multiple case study is also acknowledged (Creswell, 1998, p. 61; Patton, 2002, p. 447; Yin, 2002, p. 46). Multiple contexts are preferred to a single context for practical reasons, such as minimising the risks of relying on a single case to answer the research questions (Eisenhardt and Graebner, 2007, p. 27) and, as was the case in this exploratory work, when seeking commonality in patterns (Patton, 2002, p. 235).

The explicit focus on the judgement of enough information helped establish boundaries around the case. Beyond the need to establish these boundaries, without such a focus, the researcher was concerned she might not be able to get to grips adequately with the phenomenon of interest, the phenomenon which the research aimed to 'say something about at the end of the study' (Patton, 2002, p. 229). For participants, the judgement of enough information remained embedded within information seeking and use activities, which in turn were embedded in the work task. However, the separation of the judgement of enough information from information seeking activities was an artificial one, made conceptually for analytic purposes, to *lift the veil* on this intangible phenomenon.

The case study approach was coupled with a modification of critical incident technique (CIT), a technique useful for investigating 'complex sets of behavioural intentions'

(Urquhart, et al., 2003, p. 64). The use of CIT in this study is discussed more fully in *Section 4.3: Data gathering*.

4.2 Setting and participants

When selecting settings, the researcher needs a rich framework where she is likely to find the phenomenon to be studied (Erlandson, et al., 1993, p. 53; Lofland and Lofland, 1995, p. 16; Patton, 2002, p. 230; Yin, 2002, p. 47) and on a purely practical level, an 'ideal site' is one to which the researcher can gain access (Erlandson, et al., 1993, p. 53). In complex cases, when the unit of analysis is a phenomenon, 'the people themselves are secondary' (Miles and Huberman, 1994, p. 33). In this study the case itself was a phenomenon embedded in human information behaviour and so the decisions about setting in fact began with the selection of participants and the associated work tasks.

A rich setting, together with 'balance and variety' in cases (Stake, 2000, p. 4) maximises the opportunities for learning about the phenomenon of interest, in this study, the judgement of enough information. The research participants in this study, policy and research workers in state public sector organisations, were selected for sound methodological reasons. Policy and research workers are players in the processes of policy making, seeking and using information both as a resource and in the process of generating new information, and thus providing the sought-after information-rich environment from which to draw data about the judgement of enough information.

Researcher familiarity with the phenomenon under study is also desirable (Lincoln and Guba, 1985, p. 103). Such familiarity helps the researcher see and understand the world as the research participants see and understand it, allowing her to communicate her understanding of that world back to participants and increasing the confidence of both researcher and participants that these communications are effective (Erlandson, et al., 1993, p. 25). In this study the researcher's familiarity with both the setting and the nature of the work carried out by policy and research workers increased the opportunities for understanding how this group of workers experienced judgements of

enough information. The researcher's familiarity with the setting and the nature of the work came from five years' experience in a policy officer in a state government agency.

A second advantage of the researcher's familiarity with the setting and work was the increased chance of being able to communicate the research findings effectively to a range of audiences including professional communities such as the public service, management practitioners and information professionals, as well as information behaviour scholars.

The downside of such familiarity is the increased risk of researcher bias affecting findings. The use of paired interviews in which two participants responded to questions was one strategy aimed at reducing this risk by strengthening the voices of the participants. The ways in which the risks associated with balancing knowledge of the setting and the risks of resulting bias are discussed more fully in *Section 4.5: Quality of the Study***.**

A further consideration influenced the selection of policy and research workers as participants. As a work group, policy and research workers have not been the focus of extensive study in the field of library and information science. In particular, empirical studies that considered, inter alia, enough information and/or stopping behaviour gathered data from students (Limberg, 1999; Parker, 2006; Prabha, et al., 2007), lawyers (Kuhlthau and Tama, 2001), young web surfers (Agosto, 2002) and arts administrators (Zach, 2002). Studying policy and research workers and their information seeking and use behaviour extends and expands the knowledge base in this area of human information behaviour.

4.2.1 Recruiting participants

There is no established sample size for case study research (Patton, 2002, p. 244). Initially, a purposeful approach was taken to case selection (Patton, 2002, p. 46) with the first criterion for selection being workers in public sector organisations with major responsibilities in the development of public policy. However in what became a sample of convenience (Patton, 2002, p. 241) practical considerations, detailed below, finally determined the number and selection of participants.

Thorough preparation facilitates access to research sites (Lofland and Lofland, 1995, p. 37). With this in mind, advice was sought from a government department with whole-of-government responsibilities for the administration of the state public sector. This approach allowed the researcher to confirm the agencies selected were policy-rich sites and to seek advice on the most appropriate ways to make the initial request of the organisations. Following this consultation, an initial group of 16 organisations was approached via a letter of invitation to the Chief Executive Officer, mailed in July 2005 (see *Appendix Three*). Senior staff at twelve organisations agreed initially to participate in the study; one organisation later withdrew. In response to the initial contact, several participants nominated themselves and made direct contact with the researcher, while other participants were nominated by their supervisors.

The participating organisations were diverse in nature, with budgets ranging from $8.4 million to $7.98 billion, and staffing from 47 to more than 90,000. The nature of the public services they offered was also varied. Several organisations were large providers of human services while others were small independent authorities established to monitor and regulate public sector activity; *Table 4.1* provides an overview of the 11 agencies, in which study participants worked.

Table 4.1 Organisations participating in the study

Organisation	No. of Participants	Budget $	No. of Staff	Service Type
A	3	7.98 b.	90,938	Human services
B	2	1.37 b.	12,012	Human services
C	3	1.19 b.	2,265	Human services
D	2	708.1 m.	3289	Regulatory body
E	2	685.17 m.	2,756	Regulatory body
F	2	394.69 m.	1707	Regulatory body
G	1	346.89 m.	2776	Regulatory body
H	1	86.71 m.	224 [a]	Independent authority
I	1	78.0 m.	274	Regulatory body
J	2	17.47 m.	112	Independent authority
K	2	8.4 m.	47	Independent authority

a Excludes 5464 casual staff employed for short times at peak period

During the recruitment of participants, events occurred which highlighted the trade-offs a researcher often has to make between ideal practice and pragmatic responses to the

challenges thrown up when conducting a research project, particularly in real world settings. Between the date the letters of invitation were dispatched and the date contact with potential participants began, the Premier, the leader of the government, resigned. Leader for some 10 years, the Premier left the government at a time of significant budget difficulties. Shortly after his announcement, several other senior politicians and senior public servants also resigned. A low profile and relatively inexperienced leader assumed the Premiership and announced immediate restructures in several agencies in the state public sector. Aware that more restructures might follow, and concerned about the potential impact of these changes on the study, the researcher made appointments as quickly as possible with all of the policy and research workers who had responded to the initial request. As it turned out, only one person cancelled her participation.

Divergent views exist on the most appropriate number of cases needed in a study. Some writers suggest an optimum numbers of cases such as four (Creswell, 1998, p. 63), with more being sought only for improving generalisability, although such an aim is not necessarily a goal for researchers working with an interpretive, naturalistic orientation (Lincoln and Guba, 1985, p. 297). Others suggest more cases allow the researcher to strengthen her explanatory arguments (Eisenhardt and Graebner, 2007, p. 27; Stake, 1995) or recommending sampling by type of case such as typical or deviant (Lincoln and Guba, 1985, p. 200-1). Still others (Patton, 2002, p. 244; Yin, 2002) advocate a different approach altogether. Rather than sample participants, the researcher selects cases using a strategy of replication, initially simply starting with the first available participant and then seeking out subsequent participants to maximise variation and continuing until redundancy is achieved (Lincoln and Guba, 1985, p. 188).

In this study the original intent was to pursue a replication strategy. However, the major changes in the research setting that resulted from the change of political leadership, and the researcher's resulting concerns about losing participants meant that data was gathered from all available participants. The data gathering took place in two major stages which followed quickly one after the other and so not allowing the researcher time to pursue a replication strategy.

Twenty one cases of enough information were investigated, a number appropriate for a case study of this nature (Lincoln and Guba, 1985, p. 234; Lofland and Lofland, 1995,

p. 89). The 21 policy and research workers participated in a total of 33 interviews. Diversity was apparent in both length of their appointments in the area of policy and research (from 9 months to 30 years), and in the level at which they worked (from a recent first appointment to senior executive level). Both genders were represented, with nine male and twelve female participants.

In summary the sites selected for the study provided information-rich settings in which to investigate the phenomenon of the judgement of enough information. Although the planned replication strategy for participant recruitment was abandoned due to changes in the political landscape, the 21 participants provided a diverse set of cases of the judgement of enough information.

Table 4.2 Participants' years of experience

Years in policy and research work	No participants
< 2	1
2-5	3
6-10	11
> 10	6

4.3 Data gathering

In keeping with the naturalistic and interpretive orientation of the research, qualitative data gathering techniques were used. For case study research, gathering data from a variety of sources – documents, interviews, observation, and participant observation – is preferable as it strengthens the quality of the research (Creswell, 1998, p. 123; Fidel, 1992, p. 38; Yin, 2002, p. 85). In this study, however, for two practical reasons, the researcher relied heavily on data gathered through interviews. Firstly, the case was a judgment, that is, a cognitive activity. This activity is not something tangible which could be observed, nor is it something that is recorded or documented in the course of working life. Secondly, even had the case been observable, it was not practicable to spend time in participants' workplaces observing their information seeking and use behaviour while waiting for an occurrence of the judgement. The length of time needed was not available to a doctoral researcher, nor were participants likely to be able to structure their work to enable this kind of observation. As a result interviews were the primary source of data augmented by field notes, and publicly available information on

the organisations and in some cases, the tasks about which participants spoke. The public information provided additional insight into the contexts for the cases but did not form part of the dataset analysed.

One of the major research challenges identified in *Section 4.1: Research challenges encountered* was the difficulty of investigating a phenomenon that was part of an experience that participants were unlikely to see as a discrete and identifiable activity. Critical incident technique (CIT) was one of the techniques used to address this challenge. CIT is a 'flexible set of principles for qualitative research [aimed at uncovering] important facts concerning behaviour in defined situations' (Fisher and Oulton, 1999, p. 113). The technique is particularly useful for investigating 'complex sets of behavioural intentions' (Urquhart, et al., 2003, p. 64). By focusing participants' attention on memorable incidents, researchers using CIT assume participants will remember these incidents with accuracy and re-tell them faithfully (Urquhart, et al., 2003, p. 71).

Critical incident technique has been used extensively in human information behaviour research (Wang, 1999, p. 63). However, given the invisible nature of information seeking and use at work, CIT has its limitations since the information seeking activity itself is rarely of sufficient impact to be identified as critical (Urquhart, et al., 2003, p. 71). For example, Zach (2002, p. 53) observed that participants in her research found it difficult to recall incidents. In this study, to overcome this limitation, participants were asked to recall a work task that required them to seek and use information, rather than an information seeking incident itself. The two criteria used for task selection were firstly, that the task was either completed or was close to completion and secondly, that it had required the participant to spend time looking for information.

The tasks selected by participants for discussion were diverse in nature and are described in detail in *Section 5.5: Tasks*. Tasks ranged from the frequent and routine preparation of briefing papers for meetings of senior politicians, albeit often on topics of which the policy and research workers had little existing knowledge, to major projects described as once-in-a-career experiences such as the development of ground-breaking legislation. When larger projects were selected as the incident, participants were asked

to identify a discrete activity within the larger project as the critical incident task, for example, the preparation of a discussion paper. Although some tasks described by participants were routine, none fell into the categories of 'automatic' or 'normal' information processing tasks (Bystrom and Jarvelin, 1995, p. 194). Rather, the tasks were often unexpected and unstructured, and appeared to have more in common with 'genuine decision tasks' (Bystrom and Jarvelin, 1995, p. 195), even though the policy and research workers were not themselves decision makers.

4.3.1 Interviews as data gathering techniques

Data were gathered through semi-structured interviews. Interviews are appropriate for investigating more complex topics, where attitudes, opinions or experiences are being explored (Kvale, 1996, p. 105; Morse and Richards, 2002, p. 113), and when the phenomenon of interest is not directly observable nor accessible (Patton, 2002, p. 340), for example, when making a judgement or a decision. Indeed, interviews are sometimes the only way to obtain the data (Foddy, 1993, p. 1; Lofland and Lofland, 1995, p. 20; Patton, 2002, pp 340-1).

The semi-structured interview in particular was an appropriate data gathering technique given the exploratory nature of this study, where not enough is known about the phenomenon to prepare a structured interview guide (Lincoln and Guba, 1985, p. 236). Importantly, the semi structured interview is an appropriate data gathering technique for multiple case study (Yin, 2002, p. 89) and when using CIT (Urquhart, et al., 2003, p. 78). Less structured than the formal interview, the technique is useful in allowing a full range of views to come out and in particular, allowing those issues important to participants to be identified by them. In keeping with the exploratory nature of the research, the phenomenon of enough information was left undefined, allowing participants' own definitions to emerge during the interviews.

Two semi-structured interviews were conducted with each participant. The first interview was with one participant and the second was with participants in pairs. The paired interviews were a way to increase the richness of the data gathered, with the cross-fertilisation during the conversation helping to trigger thoughts and ideas about

information seeking and stopping of both participants, thus yielding data which was most likely richer than would be gained from individual interviews.

Joint and group interviews have not been frequently used (Frey and Fontana, 1991, p. 176) and there is little guidance in the literature. One stated purpose is in exploratory research where the phenomenon and context are new to the researcher (Frey and Fontana, 1991, p. 177). Group interviews are seen as a technique to increase both recall (Lofland and Lofland, 1984, cited in Frey and Fontana, 1991, p. 179) and the methodological rigour of the research by diluting the 'subjective, interpretive nature of the data' (Frey and Fontana, 1991, p. 180). An additional benefit of interviewing in pairs was that two participants reduced the impact of the interviewer, thus addressing the third of the research challenges identified in the introduction to this chapter.

The paired interviews were chosen in preference to a focus group for two reasons. The first reason was to reduce the likelihood of individual participants (in particular, male participants or more senior staff) dominating the conversation, and the second, the anticipated difficulty for a novice researcher of drawing out from an unstructured focus group information about the phenomenon being studied. The researcher piloted the approach during an assignment for research methods coursework in 2005 (the year the interviews took place) and feedback on this approach was provided by the course supervisor. The paired interviews proved useful in stimulating participants' recall and the researcher decided to use the approach in the empirical study.

These features of the research design – the two interviews and the paired second interview – were further efforts to address the challenge of the invisibility of information seeking at work. They were designed to increase awareness of and help participants recall and retell the incident, both the task itself and the embedded information seeking. Reviewing the questions posed during the second interview in the light of data gathered during the first helped build the interview structure around the perspectives and experiences of the participants, making the conversation more meaningful and in turn eliciting more meaningful responses (Rubin and Rubin, 1995, p. 43).

The first interview with each participant on her/his own focused on her/his role in the organisation and nature of the work being done. At the conclusion of this first interview, critical incident technique was introduced as, following Fidel and Green (2004, p. 566), participants were asked to recall a particular work task which required them to carry out searches for information. Participants selected the incidents they discussed although several brought forward a number of possibilities. Also at the conclusion of the first interview, the purpose of the second interview was explained and questions for the second interview asked, but not answered. This approach helped the participants consider the questions related to enough information in relation to both the task and the work setting. The intention was to help elicit 'more grounded' responses (Patton, 2002, p. 352) since participants had already recalled the experience of the work task itself.

The second interviews were conducted with participants in pairs. The questions asked during the second interviews focused on the closing stages of the information seeking and use experience. At the beginning of this second interview, participants were asked to brief each other on the research task on which they were focusing, a way of encouraging them to speak to each other rather than to the researcher. Although it was originally intended the participants would come from different organisations and would therefore be unknown to each other, in eighteen cases, participants who were interviewed together worked in the same organisation and knew each other, although they were not working in the same team. All participants interviewed in pairs signed a confidentiality agreement (see *Appendix Three*).

After interviewing the first eight participants (in a total of 12 interviews), the interviews were transcribed by the researcher, and reviewed with the intent of learning from the interview experience and improving techniques in the second set of interviews. The final 13 participants (21 interviews) were then interviewed. Although the researcher intended to interview each participant once on her/his own, and a second time in a paired interview, the second paired interviews did not all take place as planned and three of the second interviews were carried out with individual participants. It proved impossible to get one pair of participants together because one worked in a regional area and was rarely in the city in which the interviews took place. As a result the second interview was conducted with these two participants separately. The third participant

who participated in the second interview on his own was the 21st who had no partner. The second set of 21 interviews were transcribed by a professional transcriber, following the onset of tenosynovitis for the researcher. All transcriptions were verbatim and gaps, pauses, and laughter were included. The transcriber worked to written specifications and signed a confidentiality agreement (see *Appendix Four*). *Table 4.3* provides a summary of the interviews conducted.

Table 4.3 Type and number of interviews

Interviews	No. of interviews	No. of participants
First interview (with each participant on her/his own)	21	21
Second interview (conducted in in pairs)	9	18
Second interview (conducted alone)	3	3
Total interviews	**33**	**21**

One potentially adverse impact of interviewing in pairs was that participants might be influenced by each other's responses resulting in a shared response rather than two individual responses. It is not possible to assess the extent to which this might have occurred since at times one participant did agree with what had been said by the other participant. However at other times participants took issue with points made and it was clear that they were willing to relate their different experiences. A second possible disadvantage was that participants might have been reluctant to speak openly of their experiences, especially if they had cut corners or felt they had not done a good job. However, in a number of instances participants openly raised and discussed their less-than-successful experiences, for example, openly sharing views on the risks associated with preparing briefing papers with extremely short turnaround times, or telling of their puzzlement when they thought they had completed a task successfully but their report was unacceptable to their supervisors for reasons that remained unknown to them. There was a sense of re-telling war stories, and their comfort with this level of revelation was increased by the fact that, when arranging the interviews, the researcher had revealed she also worked in a similar area and so was also *one of them*.

4.3.2 Gathering the data

The structure of the multiple case study is designed to permit the researcher to analyse initial data, consider emerging patterns and themes and then tailor subsequent data gathering activity to focus on these patterns and themes. Although this replication strategy is preferable in multiple case studies (Lincoln and Guba, 1985, p. 187-8), the particular circumstances surrounding the data gathering stage of this study, described in *Section 4.2: Setting and participants*, meant that all the interview data was gathered in two concentrated time periods. The interviews were conducted between August and December 2005, in two stages. *Table 4.4* provides an overview of the timeframe of the data gathering.

Once the initial contact, described in *Section 4.2.1: Recruiting participants*, had been made with the participants, the researcher emailed an information letter to the participants (see *Appendix Three*) and followed up with telephone calls and emails to set up interview times. All but two of the interviews took place in the participants' workplaces, either in their offices or in meeting rooms. The other two interviews were conducted at the researcher's workplace.

All interviews were conducted by the researcher, and were tape recorded. Two recordings of the first interview (cases 16 and 18) were inaudible due to electronic interference in the interview rooms. These tapes were not transcribed and were not included in the data set for analysis. However at the beginning of the second taped interview with these two participants, they were asked to briefly review the key points made during the first interviews, prompted by field notes made at the time of the first interviews.

Field notes were made by the researcher during all the interviews and impressionistic notes of the interview experience were written up immediately after each interview. These notes recorded described the physical setting of the interviews, including aspects such as room layouts, as well as comments on how the participants appeared to approach the interview and how well the researcher felt the interview had been conducted (See example in *Appendix Six*). The researcher referred to these notes throughout the data analysis. The impressionistic notes helped her recall the experiences

of the interviews adding colour to the black and white of the transcript pages and providing added contextual richness for the analytic activity.

The two stages of data gathering and consideration of emerging themes allowed the researcher to learn from the early interviews that if she was interested in judgements of enough information, she must ask explicitly about these judgements. The explicit questioning helped focus the attention of participants on the phenomenon of interest. As well, listening to each taped interview before conducting the next, allowed some modification of the interview guide as more was learnt about what was important to participants (Rubin and Rubin, 1995, p. 43). A second benefit from this iterative approach is that it helped the researcher improve her interview technique.

Interview Questions

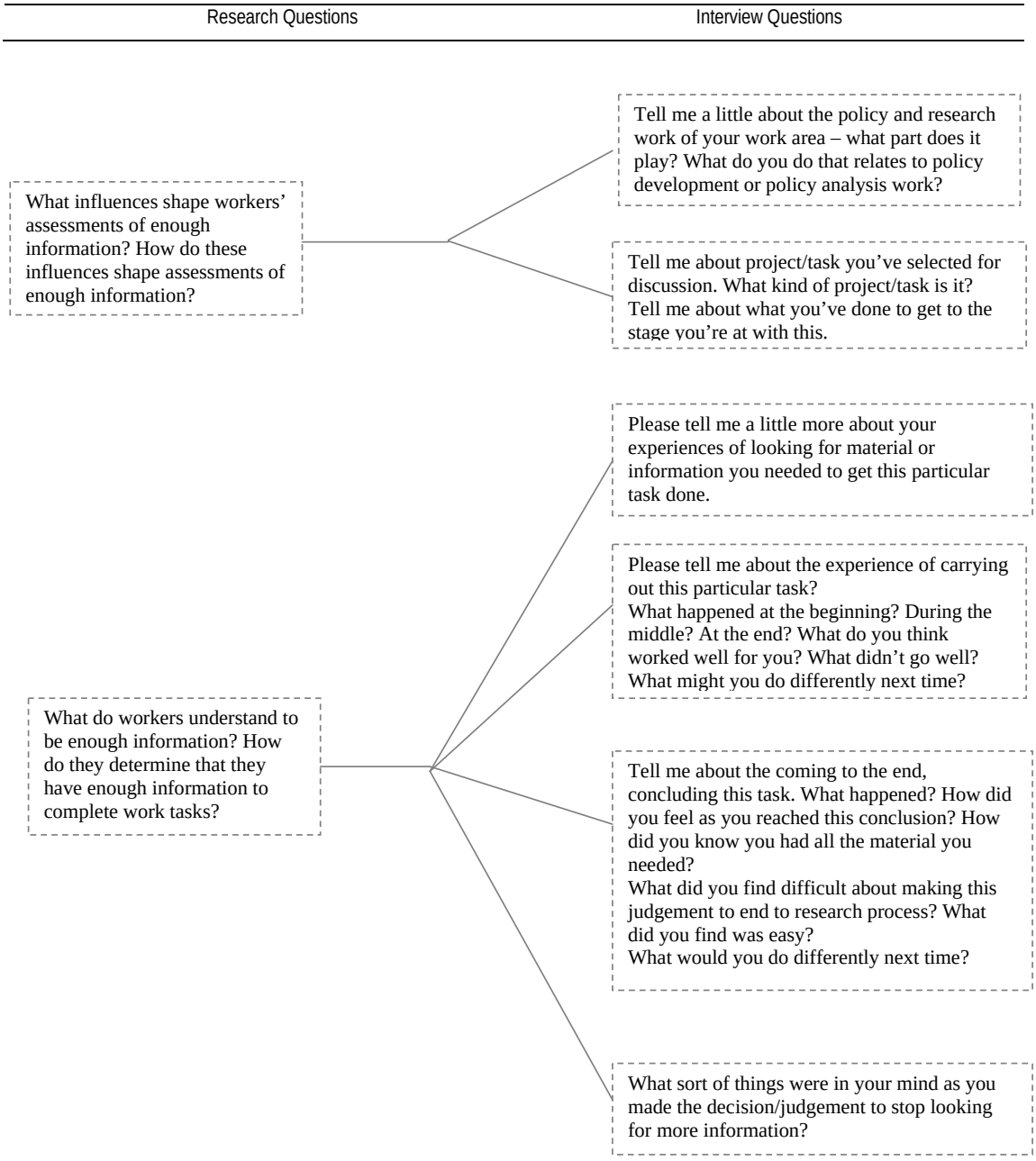
Although some qualitative researchers caution against shaping and directing interview conversations, when the researcher is investigating a particular phenomenon, some guidance through interview guides is preferable (Foddy, 1993, p. 32; Kvale, 1996, p. 97; Miles and Huberman, 1994, p. 35). In this instance, recognising the challenges presented by the invisibility of information seeking in the work place, it was felt that more explicit questioning was necessary. Without it, the researcher was not confident she would obtain useable data.

The interview guide comprised a series of open-ended questions, starting with broad scene-setting questions and narrowing through the second paired interview to focus on participants' information seeking activities and their experience of judging they had enough information. The full guides used in the two semi-structured interviews appear in *Appendix Five*. The links between the research questions and interview questions appear in *Figure 4.1*.

Asking the same question in different ways and persistent paraphrasing of questions (Kvale, 1996, p. 32) were two techniques aimed at helping participants provide 'uninterrupted descriptions' of their experience of information seeking to complete their task and of determining when they had enough. These techniques helped address the

issues related to the role of the researcher in naturalistic studies, discussed in *Section 4.1: Research challenges encountered*.

Figure 4.1 Research questions mapped to interview questions



4.3.3 Piloting the data gathering techniques

The research design was piloted with the aim of assessing the data gathering techniques rather than familiarising the researcher with the community and setting from which the participants were drawn. Pilot participants were recruited from public sector organisations that were not represented in the full study. After conducting the three interviews that formed the pilot study, one each with each of two participants and the third, a paired interview, it was clear that several modifications were needed to the research design and interview guide.

The initial interview guides had been created with the intention of permitting the participants to surface aspects of task-based information seeking of interest and importance to them. However, a great deal of tangential information was offered with little relevant information about judging enough information. As well both pilot participants had difficulty completing the activity log, left with them for completion during the period leading up to the second interview. The purpose of the log was to document instances of research activity during the days prior to the second interview around which to focus the second interview questions. However, the ways in which participants worked on their various tasks meant that, during the three days when participants were asked to complete the logs, they were not actually doing any task-related information seeking revealing a faulty assumption about their work and its scheduling.

These problems were addressed in the following ways. The guide for the second interview was refined to shape and guide the conversation along more focused lines with the intent of eliciting data on how participants made judgements of enough information. This decision resulted in the researcher framing the conversations to some extent. This seemed an appropriate response, given that the researcher sought responses that had not been forthcoming from the initial interview guide. The activity log was also omitted as it had not proved helpful in foregrounding the participants' information seeking activities.

The pilot interviews also revealed the anticipated challenges of using CIT when investigating work-based information seeking and use, with participants tending to offer

general statements about their information seeking and use and judgements of enough information. This experience emphasised the need to continually bring participants back to the critical incident task and ask them ‘and what did you do in this particular case?’

Especially when talking and probing about how participants judged they had enough information, the interview experience really brought home to the researcher that the data generated through qualitative interviews is a co-constructed and negotiated meaning (Fontana and Frey, 2003, p. 62). Participants spoke fluently about their roles and their tasks possibly because they thought about and discussed these aspects of their wok on a regular basis. However, as the conversations moved on to their information seeking, their recall was less comprehensive and their comments became more disjointed. Some information seeking activities were immediately recalled and clearly described while other activities were remembered later in the conversations when the association was prompted by a different topic altogether. During the conversations about judging enough information, the tape recordings are littered with long pauses and frequent occurrences of participants starting an explanation, stopping, starting again and again. One participant reported straight out that she did not know how she determined if she had enough information, although as she began to explain why she could not say anything useful about it, she began to unearth for herself and for the researcher some clues about how she had made that judgement.

In summary, the major stages and associated activities of the data gathering phase of the study appear in *Table 4.4*. The number of cases was sufficient to allow for redundancy of information to appear. The diversity in the policy and research workers’ experiences, the semi-structured interviews, the paired interviews and the critical incident technique focused on task rather than information seeking activity worked well to generate a set of rich data for analysis.

Table 4.4 Stages in data gathering

Stage	Timing
Pilot both interviews and activity log Analysis of pilot data	May – June 05
Phase 1 Semi-structured interviews (individual and paired) 1 to 12. Begin analysis by listening to tapes, to shape questions for second interviews	Aug – Sep 2005
Phase 2 Semi-structured interviews (individual and paired) 13 to 33 Continue analysis by listening to tapes and reading transcripts	Oct – Dec 2005

4.4 Data analysis

The overall approach to analysis of the data was inductive, in keeping with the naturalistic and interpretive nature of the research and the use of qualitative data gathering techniques. Inductive analysis sees the researcher making sense of the data (Lincoln and Guba, 1985, p. 202), reconstructing in a different way the meanings 'constructed by participants during the interview' (Lincoln and Guba, 1985, p. 333).

The flexibility of case study as a method of investigation continues as a hallmark through the stages of data analysis and interpretation. Consequently case study analysis presents a range of options and choices for the researcher, with a number of different guides providing advice for the novice case study researcher (e.g. Creswell, 2007; Fidel, 1992; Patton, 2002; Stake, 1995). An emergent approach to analysis was taken, with preliminary analysis of the first sets of data informing the refinement of the discussion guide for later interviews.

The primary datasets available for analysis were the interview transcripts. Other field texts that formed part of the dataset analysed were:

- field notes were taken during the interviews
- impressionistic notes made immediately after the interview, aimed at helping the researcher recall the interview experience.

Additional context for the interview data and field texts came from public documents. Some of these documents were provided by participants while others were sourced by the researcher. Some documents were related to the broader tasks in which the policy and research workers' information seeking activities were embedded while others were related to the organisations in which participants worked.

A staged and iterative approach to analysis was taken in keeping with the naturalistic orientation of the study. Analysis commenced with the first interview, as the tape recording was listened to before the next interview took place. More formal data analysis was carried out in three main phases:

- a preliminary thematic analysis drawing out issues raised by participants
- a case-focused analysis of the judgments of enough information (case by case as well as cross case comparison)
- an analysis of the broad context for the cases using as a framework, Taylor's (1991) information use environment (IUE).

Thematic analysis commenced when the first set of twelve interviews (8 cases) were transcribed and a preliminary thematic analysis of transcripts conducted. The thematic analysis took the form of carefully reading and re-reading the transcripts, and listening to the tapes to understand the concepts being discussed and to identify salient concepts and begin to understand their inter-relationships (Ezzy, 2002, p. 88). The thematic analysis was an important first step. It allowed the voices of the participants to be heard (Ezzy, 2002, p. 83), and so was another technique for minimising the risk of researcher bias. The second set of transcripts (21 interviews, 13 cases) was also transcribed in a batch and the thematic analysis continued. The themes that emerged from the thematic analysis aided the case analysis subsequently carried out.

Once again, particular circumstances – in this case, the onset of tenosynovitis in both arms of the researcher – interrupted the plans to continue the early analytic work by listening to the tapes as they were transcribed. While the first eight encounters (12 interviews) were transcribed by the researcher, the subsequent interviews were done by

a professional transcriber. This meant a longer time period between interview and the initial reading of the transcripts. The thematic analysis began with the researcher working with paper copies of the transcripts and physically cutting out salient blocks of text. Once the medical condition was under control, the thematic analysis continued with electronic copies of the transcripts and data.

4.4.1 Case analysis

The case, as noted in *Section 4.1.1: Research design*, was the judgement of enough information, examined in multiple cases. For case study researchers, two distinct but related ways to 'reach new meanings' (Stake, 1995, p. 74) are available. Firstly, a case by case approach may be used, in which researcher examines one case and notes understandings from it, then examines a second case, looking for similarities and differences and as further cases are analysed, examining the variations in the experiences of the phenomenon. Secondly, cross-case analysis sees the researcher examining each case against the interview questions which if well-structured provide an analytic framework.

Case study researchers may use either or both approaches, with the decision to use either direct interpretation or aggregation flowing from the focus of the research. When both approaches are used, it is immaterial which technique is used first, (Patton, 2002, p. 438). However, because this was an exploratory study with interview questions intentionally very open and non-directive, the first approach, case by case, was deemed a more appropriate way to approach the data analysis. Data were analysed using this technique of constant comparison (Patton, 2002, pp 490-1), beginning with the case by case analysis and following that with the cross case analysis. Examples of analytic tools used appear in *Appendix Six*.

The case analysis phase began with the writing of a description of each case (Creswell, 2007, p. 163; Patton, 2002, p. 434), Case summary notes were also prepared – a chronology of what had happened during the task and the information seeking and when judging of enough information, why these events had happened and how participants felt about the events. These two techniques helped keep all 21 cases separate and distinct in the researcher's mind as she moved through the successive analytic stages.

The case descriptions and summaries provided the material for the vignettes that appear in Chapter 6 and in *Appendix 6*.

Some researchers advise the use of a pre-established albeit provisional analytic framework of codes or categories in case analysis (Miles and Huberman, 1994, p. 58). However, a naturalistic researcher may draw categories from a range of sources (Tesch, 1990, p. 141) and in this study, a different approach advocated by Patton was used. Once the case description is written up, Patton (2002, p. 452) advocates pattern, theme and content analysis as 'analytic strategies […] to further analyse, compare and interpret the cases'. Patterns, descriptive findings drawn from participants' reports and themes, categorical or topical interpretations, made by the researcher and based on participants' reports (Patton, 2002, p. 453) are two types of categorisation used in the analysis.

Case by case analysis

Each full transcript was reviewed and, using as broad categories, 'sensitising concepts', that is, categories brought to the data by the researcher (Patton, 2002, p. 456) developed out of the literature review and the thematic analysis, salient units of data were identified and labels assigned to them. The nature of the study compelled the researcher to work with these sensitising concepts since she was interested in a phenomenon which participants did not normally think or talk about or even recognise. In this study, sensitising concepts included *judgements*, *decisions*, *information seeking activities*. As well, the major 'indigenous' patterns (Patton, 2002, p. 454) identified from the thematic analysis included the role of deadlines, the iterative nature of the judgements of enough information and the use of feedback from colleagues.

Working with the data grouped into the main categories determined from the sensitising concepts, a case by case analysis was conducted. Starting with one case, the transcript segments and field texts were read and three questions asked:

- what does this data tell me about how the participant reached the judgement of enough information?
- what does this data tell me about the relationship between the critical incident task and how the participant reached the judgement of enough information?

- what does this data tell me about how contextual factors interacted with the participant's judgement of enough information?

Analytic notes were made about what the participant had reported that related to each of these questions for the case under review – noting patterns, links and inter-relationships. The next case was reviewed in the same way and the final step in this stage was to compare the two and ask, What is the same? What is different? This analytical work continued in the same way, with each of the 21 cases. The writing of memos and notes started with what each participant reported as important about his or her experience but as the case by case work proceeded, participant's reports were augmented with the researcher's interpretive comments, which sought to clarify ideas about what the data meant, reduce the overlap between categories and more tightly define the categories.

A particular challenge during analysis related to the terminology required to describe one aspect of the policy and research workers' experiences of judging enough information. The central interest of the thesis was in understanding one aspect of human information seeking and use behaviour, that is, the judgement of enough information. The researcher's position on the relationships between the policy and research workers and the contexts and situations in which they sought and used information was presented in *Section 2.4: Enough information in context* and *Section 3.2.1: Relationship between person and context*. Summarising here, the underpinning and framing meta-theory for the research was what Talja et al (2005) termed a collectivist approach. In line with this non-dualistic approach, the study was designed and conducted from the perspective that 'person and world [are] … internally related' (Marton, 1996, p. 175).

Cognition is recognised in the thesis as a 'complex social phenomenon' (Lave, 1988, p. 1). Working from the perspective that social interaction is central in shaping changes in behaviour, both cognitively and emotionally, and with a unit of analysis that was a cognitive activity, a descriptive term was needed to make visible the cognitive activity described by the policy and research workers.

The term *mental template* was assigned to describe the cognitive representation developed by the policy and research workers as they began their tasks, carried out their information seeking and made iterative assessments of enough information. The term

was chosen to avoid similar terms in common usage, such as mental models or frameworks since these commonly used terms are used in different literatures in different ways. The research was not seeking to prove or disprove use of such cognitive models and the researcher wanted to minimise bias her analytic and interpretive work by avoiding short hand thinking that might flow from using common terms. Template was chosen in preference to other terms such as map or blueprint because the researcher felt the concept of a template permits the meaning of a more flexible guide than do the other terms. The term seemed to best capture the experience of the policy and research workers and the intention of the researcher.

The final and important part of the case by case analysis was a negative case analysis (Stake, 1995, p. 76). Intended to increase the credibility of the research findings, the negative case analysis requires the researcher to revisit the case data, testing working hypotheses that had emerged from the data. In this instance, the primary working hypothesis arising from this stage of the analysis was that the judgement of enough information was experienced as an iterative process during which the nature of enough information changed as a result of feedback from colleagues and supervisors, feedback that related less to the information itself and more to the nature and purpose of the task. The negative case analysis was a strategy that sought to uncover exceptions to working hypotheses, which then required the researcher to re-examine the exceptional cases and refine the emerging interpretation to include or deal with those exceptions (Patton, 2002, p. 554).

In this study, one example of a working hypothesis that was discarded as a result of the negative case analysis was to do with the role of experience in making judgements of enough information. In the early stages of the case analysis the researcher noted that the length of time a participant had been with an organisation appeared to be associated with successful task completion and an important factor in the judgements of enough information. However subsequent analysis revealed negative cases and this tentative hypothesis was abandoned.

Cross case comparison

At the end of this case by case analysis, detailed and salient information about each case of judging enough information was available, enabling a cross case comparison to be carried out. This step saw analysis moving from the discovery of commonalities and differences in the individual cases to the early stages of theory building. Other analytic techniques, such as the matrices advocated by Miles and Huberman (1994, pp. 175-6) were found to be useful in starting to investigate the relationships between the different categories. These matrices afforded insights and helped to firm up emerging findings and to identify discrepancies and disconfirming evidence. Matrices developed compared the judgement of enough information against:

- the nature of the task
- whether or not the task was assigned to the policy and research worker or self-initiated (see example in Appendix Six)
- the length of time participants had worked in the area of policy and research
- the length of time participants had worked in the organisation.

4.4.2 Analysis of context using Taylor's information use environment

One of the research questions driving the study sought an understanding of the nature of the relationship between contextual factors and the judgement of enough information. An analysis of the data against Taylor's information use environment (IUE) model (1991) was a strategy to organise and describe the environments in which research participants worked and from which they invoked the context for their information seeking and use, and judgements of enough information. The analysis contributed to the study findings in two ways:

- providing the thick description important to understanding case study findings
- facilitating the examination of the relationship between contextual factors and the judgement of enough information.

Although the case analysis of the judgement of enough information was intentionally flexible, a different, more structured approach was taken to the IUE analysis. The first step was to develop codes drawn up around the categories and sets of characteristics of

information use environments described by Taylor. Working with clean transcripts, each interview was read again, with the researcher asking the questions:

- what does this unit of data tell me about the people?
- what does this unit of data tell me about the problems?
- what does this unit of data tell me about the setting?
- what does this unit of data tell me about how the information was used to resolve the problem?.

The transcripts were annotated with pre-established codes and structured tables were used to capture the relevant data, the researcher's interpretive comments and illustrative quotations. The patterns and subsequently, themes, which emerged from this new analysis were cross checked against the units of data categorised as context-related during the thematic analysis. The emerging understanding of the information use environment was enhanced by data from other sources, such as reports published by the participating organisations, for example, their annual reports, and the position descriptions of participants. Position descriptions are detailed job descriptions that included statements about the role of the position, the nature of the work done and the challenges faced in the position. Finally, working with the completed data tables, the analytic notes on the information use environment within which each judgement of enough information was made were brought together into a single table, which clearly revealed the characteristics common to the information use environment of the research participants.

The successive phases of analysis described in this section are summarised in *Table 4.5*.

Table 4.5 Stages of analysis

Analytic activity	Timing	Output
Listening to tapes [a]	Aug – Dec 05	Improved interview technique Refined interview guide, with more focus on phenomenon of interest
Preliminary thematic analysis [(ii)]	Oct – Dec 05	Emerging themes 'indigenous' concepts
Case descriptions, case summaries	Dec 05 – Jan 06	Brief summaries of each case
Case by case analysis	Apr – May 06	Early categories recorded in marginalia, memos, notebooks, post-it notes
Cross case comparisions	Jul – Sep 06	Developing inter-relationships and interpretive insights, recorded in marginalia, memos, notebooks, post-it notes
IUE analysis	Oct 06 – Feb 07	Contextual factors categorised

[a] Immediately after each interview took place. [b] Concurrently with the second phase of data gathering.

4.5 Quality of the study

Many naturalistic researchers (e.g. Patton, 2002, p. 432; Stake, 1995, p. 71) have observed that analysis and interpretation of data is not the neatly segmented research activity described above. The experience of this researcher reflected this observation. Acknowledgment of the sometimes disorderly nature of the research process does not reduce the imperative to demonstrate the trustworthiness (Lincoln and Guba, 1985, p. 290) of the study. Broader criticisms of case study research, such as the lack of generalisability of case findings, were analysed and responded to in Chapter 3. This section details how discipline and rigour were brought into the study overall, and in particular into the analytic and interpretive work.

It is encumbent upon all researchers to establish the 'trustworthiness' (Lincoln and Guba, 1985, p. 290) of their research findings. Lincoln and Guba's classic approach requires the researcher to do so by assessing her work against the four criteria of credibility, transferability, dependability and confirmability (1985, pp. 301-27). As well as these specific techniques Lincoln and Guba advocate the use of a reflexive journal (p. 327), kept throughout the period of the research. Following this advice, the researcher began a reflexive journal at the time of preparing the research proposal that formed part of her application for admission to the doctoral program. The journal in the form of research notebooks is a record of the life of the researcher's candidature. The notebooks

capture the researcher's experiences and reflections on those experiences, emerging thoughts about the scope and nature of the thesis, the reasoning behind the methodological decisions made, the lessons learnt along the way and personal observations on the feelings and thoughts on carrying out the empirical study and on the doctoral experience itself. In addition to the notebooks, the progress of the candidature and the study was documented in detailed project plans for each semester, against which progress was formally reported.

Credibility

Researchers demonstrate the credibility of their research in two ways: firstly, by ensuring that the study was conducted 'in such a way that the probability of the findings will be found to be credible is enhanced' and secondly, demonstrating that this credibility is felt by the research participants as the 'constructors of the original multiple realities' (Lincoln and Guba, 1985, p. 296). The techniques were used in this study to enhance credibility:

- prolonged engagement
- triangulation
- negative case analysis (already described in *Section 4.4.1: Case analysis*)

Although the opportunity for prolonged engagement, as envisaged by Lincoln and Guba (1985, p. 301-2) was limited, the two-interview approach went some way towards building rapport and trust between participant and researcher (Fontana and Frey, 2003, p. 78; Lincoln and Guba, 1985, p. 303; Weiss, 1994, p. 57), one of the major objectives of prolonged engagement. As well the researcher's own insights into the nature of participants' work and the tasks identified as the critical incident tasks provided a basis for building rapport.

Triangulation seeks to 'test' for consistency (Patton, 2002, p. 556) and is a strategy aimed at reducing the risk of 'systematic bias' in the research findings (p. 563). Options for triangulation may be methodological, theoretical, data source or the use of multiple analyses (Patton, 2002, p. 556). In this study, opportunities for triangulation were somewhat limited. To an extent, the range of different public sector agencies

represented and the range of different critical incident tasks used by participants as the critical incident provided a degree of data triangulation (Patton, 2002, p. 559). The paired interviews were also a triangulation strategy (Frey and Fontana, 1991, p. 178) and the diversity in the experience of participants and variety in the nature of the tasks in which participants' information seeking and judgements of enough information were embedded also afforded a degree of data triangulation.

Within the parameters of doctoral research, meeting the second of Lincoln and Guba's credibility requirements was difficult. In particular, member checks in the manner advocated by Lincoln and Guba (1985, p. 314-5) were not undertaken in this study because the researcher needed to demonstrate that the interpretations of participants' experiences of determining they had enough information was her own interpretation.

Transferability

The transferability of findings relates to making it possible for other researchers or for other audiences to judge whether or not the findings will hold in other settings. While Lincoln and Guba (1985, p. 298) argue that a large part of this judgement is up to the other researchers or audiences, it is important that the researcher provide these groups with a sufficiently 'thick description' to permit such a judgement. Two aspects of this study meet this demand. The rich description of the context in which study participants experienced judgements of enough information, framed against Taylor's (Taylor, 1991) Information Use Environment, is provided in Chapter 5. The narratives of selected cases in Chapter 6 provide further detailed descriptions of particular experiences of participants in determining they had enough information. These two aspects together enable others to assess the transferability of the study findings.

Dependability

Two of the four techniques proposed by Lincoln and Guba require people other than the researcher to demonstrate the dependability of the study and were therefore not available to the researcher in the context of doctoral research. The study relies on Lincoln and Guba's argument that the techniques that demonstrate the credibility of the

study also demonstrate dependability since there can be ‘no credibility without dependability’ (1985, p. 316).

Confirmability

The fourth criterion for demonstrating the trustworthiness of the research goes to assuring the audience of the confirmability of the findings (Lincoln and Guba, 1985, p. 300), that is, ensuring the research findings are influenced as little as possible by the ‘biases, motivations, interests, or perspectives’ of the researcher (Lincoln and Guba, 1985, p. 290). Yin (2002, p. 11) cautions that case study is difficult to do well, in large part due to the ability of the researcher herself. Unfortunately though Yin does not provide criteria of a good case study researcher against which the researcher could assess her research ability. In this study, issues to do with the role of the researcher as the ‘research instrument’ focused on two aspects: firstly, the familiarity of the researcher with both the public sector environment and the nature of the work of participants, and secondly, the impact of the experience and ability of the researcher on the study.

The researcher intentionally selected the setting and participants for the study, knowing they had similar backgrounds and work experience to the researcher. This familiarity was both an advantage and disadvantage. The common experiences and knowledge of the public sector afforded an advantage in the effort to develop a shared construction both of the tasks that formed the critical incidents and of the role of contextual factors in shaping the judgement of enough information. However, this familiarity also presented a challenge, in the need to guard against the risk of seeing only what the researcher wanted or expected to see, and conversely, not seeing ‘what [she] don’t have words or ideas for’ (Becker, 1998, p. 18). Reducing this potential negative influence on research findings required first, that the researcher acknowledged its existence. Secondly the research design and particularly, the techniques for data gathering and analysis must make clear to all readers that the researcher has actively sought out data that contradicts any expectations or ‘working hypotheses’ she may have had (Lincoln and Guba, 1985, p. 124). The analytic technique of constant comparison, searching for similar and different characteristics forces the researcher to make explicit and leave behind bias (Eisenhardt, 1989, p. 541). As well, the open-ended nature of the interview guide

questions and the paired interviews (*Section 4.3.2: Gathering the data*), and the negative case analysis (see *Section 4.4.1: Case analysis*) all contributed to minimising the risk of hidden assumptions or biases influencing the findings of the research. The audit trail in *Appendix Seven* adds to the confirmability of the study.

The strategies detailed in this section document the effort made to achieve Silverman's 'gold standard' for the quality of the research, that is, the demonstration that the reader of the research report may be confident in believing the findings (Silverman, 1997, p. 25). The techniques used to ensure the quality of this research are demonstrated against the four criteria advocated by Lincoln and Guba (1985) in *Table 4.6*.

Table 4.6 Demonstrating the quality of the study

Criteria	Technique	In this study
Credibility	Prolonged engagement	Two interviews
	Triangulation	Paired interviews; data sources; theory triangulation
	Peer de-brief	Supervisors' meetings
	Negative case analysis	Conducted
	Referential adequacy	Tape recordings and unannotated verbatim transcripts retained in accordance with university policy
Transferability	Thick description	IUE analysis Case descriptions Case narratives
Dependability and Confirmability	Inquiry audit	Audit trail
Reflexive journal	Project plan	Thesis plan Plan for the empirical study
	Personal diary	Research notebooks

Chapter Conclusion

The research design described and justified in this chapter was aimed at addressing the challenges encountered in planning this in-depth exploration of enough information, identified in *Sections 3.2: Methodological Orientation of the study* and *4.1: Research challenges encountered*. The flexible emergent design of the multiple case study, together with the semi-structured individual and paired interviews, combined to leave the researcher confident that challenges identified in Section 4.1 had been addressed and

met. The flexibility of the case study approach carried through to the analysis of the data, which was also carried out with an emergent approach.

The experience of designing and conducting the study reinforced the need for flexibility on the part of the researcher. Planning the research to ensure congruity and fit between all aspects of the study was critically important. Just as important was the recognition that in empirical studies in naturalistic settings, the research does not always proceed exactly as planned. Learning this lesson emphasised the value of the case study approach with its inbuilt flexibility for investigating phenomena in real world settings.

A hallmark of case study research is the rich description of the real world settings in which the case is examined. The detailed, textured and layered descriptions of the contexts in which cases are examined enable readers of the research findings to evaluate the plausibility of the findings and to assess the transferability of the new knowledge reported in the findings to other groups and settings. This rich description of the participants' experiences of judgements of enough information is provided in the next chapter.

Chapter 5

The Information Use Environment of Policy and Research Workers

This chapter presents study findings that provide a description of the context in which participants made judgements of enough information. Chapter 6 presents findings on the two research questions that shaped the study.

A major strength of the case study approach is the embedding of research findings in a rich and holistic description of the context in which the case has been investigated. Such a description aims to help the reader 'enter into the situation and thoughts of the people' (Patton, 2002, p. 503) whose experiences are reported in the case study. In this chapter the contexts are described in which the study participants, public sector policy and research workers, sought and used information and made judgements of enough information.

The organising framework for the analysis and the description of the contexts in which judgements of enough information were made is the information use environment (IUE) model (Taylor, 1991). Beyond the four main categories of the IUE described in Section *2.4.2: Relationships between people and contexts*, Taylor also considered *decision processes*, that is the ways in which decisions are made in organisations, as part of the IUE element of setting (1991, p. 249). However in the following description of contexts in which the policy and research workers in the study made their judgements of enough information, decision processes are treated as a separate element of the IUE because these processes played a substantial role in shaping the ways in which judgements of enough information were made by study participants.

In the study policy and research workers, in finding and using information to resolve typical problems, did so by way of typical *tasks*, such as preparing written papers. The tasks were typically complex ones for which neither the information needed nor the outcomes required could be specified at the outset (Bystrom and Jarvelin, 1995, p. 194). Given the focus of the thesis on judgement and decision making during information

seeking and use and acknowledging the importance of task in shaping human information behaviour in the workplace, types of tasks carried out by the policy and research workers in the study are also described as a separate element of the IUE of the participants. This element is an addition to Taylor's model and was added because task was highly pertinent to the study participants' information seeking activities and judgements of enough information. *Table 5.1* provides an overview of the IUE model as it was used to describe the contexts in which judgements of enough information were made by the policy and research workers.

Table 5.1 The information use environment framework

Main Elements	Sub Elements
Sets of People	Non-demographic variables - media use, information channels - social networks
Problems	Well structured / ill-structured Complex / simple Assumptions agreed / not agreed Familiar / new patterns
Settings	Organisational style and structure - communications - timeframes - organisational attitude towards risk and uncertainty
Resolution of problems	Range of information uses Range of information traits
Decision processes[a]	
Tasks[a]	

Note. Based on (Taylor, 1991, pp. 231-232)
a Elements added to Taylor's original model by researcher based on study data

Before going on to describe the contexts in which the policy and research workers in the study were working, two points need to be made. Firstly, the descriptions of the contexts in which the judgements of enough information were made are drawn from two sets of data. Published literature about the public policy process provided a broad brushstroke framework which was then fleshed out with data from the interviews. Secondly, the intent of the research was to explore judgements of enough information rather than to describe and analyse the information use environment of the policy and

research workers. Because of this, the interview guide was not specifically aimed at illuminating all the different dimensions of the information use environment of this group of professionals.

Study participants were asked to talk through the experience of being assigned work tasks, identifying the information needed, locating and gathering together that information and then using it to complete their tasks. In talking about their experiences of seeking and using information to complete their tasks, the policy and research workers foregrounded a number of elements in the contexts in which they worked that had a bearing on their information seeking and use. Elements of the information use environment salient to the information seeking activities of the policy and research workers emerged from the interview data that related both to the specific tasks which were the critical incidents used to elicit data, and to the broader work environment.

Information in public policy making

The nature of information use in the public policy process is outlined to provide a broader context for the information seeking and use of the policy and research workers. The role of information in the public policy process is of perennial interest to scholars working in the field of public policy with an enduring concern in how research findings inform policy development and decision making appearing in the literature since the 1970s. Four approaches have been identified (Stone, et al., 2001) as models of how research findings are used in the public policy process.

The rational model (Stone, et al., 2001, p. 5) sees information and research findings incorporated into policy through a logical often linear process, one phase of which is for example, gather data on the issue. ‘Muddling through’ (Stone, et al., 2001, p. 5) reflects a more pragmatic approach to public policy making in which incremental change is based on existing practice and information and research findings tend to be marginalised. Understanding the role of information and research findings in public policy as ‘knowledge utilisation’ sees information and research findings become part of practice over time through a process termed ‘enlightenment’ (Stone, et al., 2001, p. 6). The policy paradigm model reflects a view of policy making in which coalitions and

interest groups dominate and information and research findings are most used when policy makers and stakeholders recognise the need for a radical policy paradigm shift.

The interest in the role of information and research findings in policy making continues (Stone, et al., 2001, p. 1), with Rich and Oh (2000, p. 174) observing an increasing interest in 'the patterns of use and/or non-use of information in policy making', although when dealing with long-term, intractable social problems, governments may prefer to base policy decisions on their platform. While newer issues require 'research and reflection' (Bridgman and Davis, 2004, p. 27), public sector practitioners (UK Cabinet Office, 1999; Young, 2004) acknowledge that research findings are only one input into the policy process. Recent interest in this issue is also reflected in the emergence of evidence based policy as an approach to developing policy interventions based on 'what works' (Nutley, et al., 2007, p. 10), an approach which some scholars (Sanderson, 2003, p. 332; Stone, et al., 2001, p. 5) suggest represents a return to the rational model of knowledge utilisation in the public policy process.

Evidence based policy emerged in response to increased accountability in public sector management and an increase in the number of stakeholders seeking to influence public policy making (Davies, et al., 2001, p. 1), stakeholders which include the media, interest groups, lobby groups, political parties, the general public, legislatures and their committees, public servants, both senior bureaucrats, middle managers and staff such as policy and research workers, and government-established advisory groups (Colebatch, 2002, p. 26; Gualtieri, 1999, pp. 18-28). The field of evidence based policy is characterised by 'different conceptions, claims, rhetoric and practices' (Simons, 2003, p. 303) and critical assessments of the approach have revealed a number of concerns. For example Sanderson (2003, p. 332) questions whether 'what works' should be the only criteria to be used when determining public policy and suggests policy decisions should also be concerned with moral and ethical issues. Of particular interest, given the setting of the empirical study, is the process through which a range of different forms of 'evidence', for example, from systematic reviews, case studies and program evaluations, informs public policy decision making.

In this chapter, the elements of the policy and research workers' IUE are discussed in the groups listed below. As the problems themselves and the resolutions to them were seen as two sides of the same coin (Taylor, 1991, p. 225), these two elements were integrated in the description of the case context.

1. People: Media used, channels, networks
2. Problems and problem resolutions
3. Setting
4. Decision processes
5. Tasks.

5.1 People: Media, channels and networks

Although policy-making is frequently seen as the business of politicians and senior bureaucrats, other actors, including public officials at all levels, are involved in the process (Bridgman and Davis, 2004, p. 11). Policy and research workers are 'policy specialists within departments who provide detailed advice on submissions, coordinate government action' (Bridgman and Davis, 2004, p. 141).

While senior public servants have traditionally wielded great influence in the policy process, recently, 'lower/middle level bureaucrats', such as the policy and research workers who participated in this study are gaining in influence, in part because of their wider use of a range of information sources, including electronic sources (Gualtieri, 1999, pp. 26-7). Beyond the bureaucrats of all levels, other stakeholders in the policy process include the media, interest groups, lobby groups, political parties, the general public, legislatures and their committees, and government-established advisory groups (Colebatch, 2002, p. 26; Gualtieri, 1999, p. 18-28). As well as formal consultation and informal liaison with these stakeholder groups, policy and research workers often establish their own informal professional networks (Edwards, et al., 2001, p. 9).

Policy and research workers are 'domain experts', people who seek and use information in their role of 'interpreting situations, solving problems, and making decisions' (Choo, 2002, p. 238). They draw on information from a range of resources and through a number of different channels. They use findings from unpublished research, from

reviews and reports, published journal articles. They engage in formal consultation with peers and with the public. They also use as information sources existing policies, either from within their own agency or government, or from other jurisdictions (Bridgman and Davis, 2004, p. 54). Their own individual knowledge base is another important ingredient in their work, and includes the policy and research worker's 'expert knowledge', previous policy statements and positions and research findings (Colebatch, 2002, p. 118). Although government agencies frequently commission external research consultants to conduct original research, this kind of information seeking is also done internally, by policy and research workers themselves. When this external research-based information is used by policy makers, it is policy and research workers who often re-construct meaning from the findings. The experiences of the study participants reflected this situation.

The policy and research workers taking part in the study used different media and channels to meet different information needs in carrying out this work. The policy and research workers in the study often started with a web search, seen as a useful first step for establishing their bearings in sometimes unfamiliar subject fields. They also used the web for tracing sources of more authoritative information. The policy and research workers turned to colleagues known to have relevant experience to find out why particular problems were on the agenda and which groups were affected by the problems. For example, one of the policy and research workers began his information seeking by going to the web to source information on how similar government agencies in other jurisdictions had handled the policy issues associated with his critical incident task. He then followed this web search up with telephone calls to his professional counterparts in these jurisdictions to find out what was really going on with their policies and policy implementations.

Other important sources of information were the organisations' corporate records and working files. These resources contained information about how the problems had been handled previously. For example the corporate files were the first information source consulted by Cath[2] when she was assigned the task of developing an organisational policy on service evaluation. Again however the policy and research workers turned to

[2] Participants were assigned names by the researcher

colleagues or supervisors for more nuanced assessments of how the problems had been handled previously, the current status of the problems and potential solutions.

The policy and research workers needed information as raw material for their tasks, information such as facts and figures sourced from scientific or statistical reports, or information about policies or interventions that had been implemented in other jurisdictions. For example the critical incident task that Quentin undertook was an investigation into discrepancies in statistical reports submitted by his organisation. Quentin initially needed the statistical data that had been reported as the basis from which he could start his investigation.

As they prepared their papers and reports, participants also needed information to serve as authoritative evidence in their work and it was for this kind of information that they most frequently sought out the academic literature. They were most likely to source this evidentiary information from the organisation's library or information centre, when there was one, although they also used to web to source journal articles and reports. The policy and research workers also needed information on reactions to current issues and proposed solutions, and on emerging issues. For this they relied on websites of public sector agencies and of industry groups, media reports and formal and informal professional networks. For example, Tim drew on information and advice from industry representatives, the knowledge of departmental staff and the media, the latter source used as a way of gauging community concerns. It was only after surfacing key issues from these three sources that Tim initiated formal literature review on the topic under consideration.

5.2 Problems and problem resolution

The nature of public sector policy work generally is ambiguous and complex (Colebatch, 2002; Considine, 1994; Gualtieri, 1999), characterised by 'continuous work on persistent issues' (Considine, 1994, p. 189) in a process that is 'long and often convoluted' (Bridgman and Davis, 2004, p. 1). While early portrayals of policy saw it through rational eyes as the action taken, or not taken, by government (Dye, 1987), a more recent definition of policy, as a 'point of relative firmness built into a continuing

flow' (Colebatch, 2002, p. 15), highlights the ambiguous nature and complex process of policy and policy making. Dealing with a 'never ending jumble of ambiguous issues' (Feldman, 1989, p. 89) public sector policy analysts[3] work in a state of ambiguity within a value-laden political landscape (Bridgman and Davis, 2004, p. 31).

No matter how the policy process is construed, information is sought and used throughout that process. Information is needed as input to the process, is used when analysing and synthesising and is disseminated as an output of the process (Gualtieri, 1999, p. 9; Stewart, 1999, p. 70) and its meaning is managed throughout (Ezzy, 2002, pp. 37-8). Policy analysts are expected not only to represent the interests of their organisations or units but also to inform and advise senior staff about what positions can or should appropriately be taken or defended by the organisation (Feldman, 1989, p. 74). Their work serves an enlightenment function in assisting senior policy makers interpret and understand the 'contexts, structures and nuances of a particular issue' (Ezzy, 2002, p. 35). However, because the policy problem is often not well defined (Feldman, 1989, p. 92), policy and research workers cannot always know in advance what information will be needed. As a way of dealing with this imprecision and ambiguity, a distinguishing feature of the information seeking and use behaviour of policy and research workers is the constant monitoring of the broad political landscape for a range of different types of information which may or may not be put to immediate use.

Public sector organisations are created and adapted to manage large scale societal problems such as housing for disadvantaged groups or protection for vulnerable workers. These larger problems are typically enduring and persistent. However, the study demonstrates that over time, more immediate problems associated with these problems emerged and had to be managed. The focus of the discussion in this section is on the more immediate problems rather than the larger overarching societal problems being managed over the longer term. However, for the sake of consistency with the terminology used in the IUE framework, the term problem is used to identify the more immediate problems that triggered the tasks undertaken by the policy and research

[3] Feldman used the American term policy analyst to identify the public sector staff described in the empirical study as policy and research workers. Feldman's term is used throughout this chapter to distinguish policy workers in general from the policy and research workers who participated in the study.

workers in the study. Some of the problems had been on and off the political agenda for a number of years. The policy and research workers continued to work on problem resolutions knowing that their recommendations may not be approved if the political wind shifted direction or that the problem could disappear from the political landscape.

As an example of this nested relationship between problems, the task on which one study participant, Naomi, was working was a data model to be used to assess the various impacts of different funding options for public housing. The problem that triggered this task was the reduced amount of money available to the Government to fund public housing. However the larger social problem of providing accommodation for those citizens without the resources to provide for themselves is a persistent and long term challenge for government.

The problems encountered in the study were of several different types. Many of the problems such as case 12 a systematic review, had emerged from a perceived need to improve outcomes for a particular group of citizens. A second group of problems, for example, case 17 a draft strategic policy on forest management, aimed to improve the management of state assets. A third group, for example, case 21 a quantitative data model, was focused on accessing the impact of anticipated or proposed changes while a fourth group of problems such as case 9 an internal policy, was concerned with improving the processes of government. Two remaining problems fell outside these four groups. One was part of a long running debate about the philosophical underpinnings of funding for education. The second problem was an inquiry about apparent discrepancies between funding provided for disability services and the number of clients serviced.

5.2.1 Characteristics of the problems in the study

A number of the problems were persistent ones that had resurfaced in a slightly different guise than previously. Other problems had been identified more recently, having emerged from changes in the environment. Clare found for example the court challenge on which she had to prepare a briefing had first been brought forward in the early 1960s. The more experienced policy and research workers were very aware of this phenomenon of some problems simmering in the background and never being

completely resolved. For example, several policy and research workers were accepting of their recommendations for problem resolution not being approved, or the problem being put on the back-burner because it was a low priority or because of a perception that the timing was not right. They put their work aside, either in corporate records or in more informal working files, until the timing was more propitious. Carol commented:

> I live with a great deal of uncertainty with regard to this but I also work on the assumption absolutely nothing is lost. If we do original research and analysis, the climate may be different five years from now and the core of the work well, the germ of it, may be useful (Carol, IV8, L72-4)[4].

This experience is reflective of constraints reported by Feldman on the efforts of policy and research workers to prepare information outputs as aids in the process of interpreting and understanding policy issues. Firstly, confronted with the challenge of an ill-defined policy issue, it is difficult for policy and research workers to be sure about what information is actually needed. Secondly, Feldman found a strong push to seek out information from a variety of sources (Feldman, 1989, p. 11, p. 94) as policy and research workers, in response to this constraint, built up collections of formal and informal resources around issues which may or may not become hot topics.

For the persistent problems which had been around for a number of years, there was often a trail of information about how the problems had been viewed previously and about what had been tried as a resolution. This was useful information for the policy and research workers in the study but did not represent an available or possible resolution for the problem in its current incarnation. The persistent nature of some of these problems was one reason the policy and research workers continually monitored and scanned the environment, an activity discussed in more detail in the findings presented in Chapter 6.

Other problems however were recent developments triggered by changes in the environment. For example, the task discussed by Quentin was triggered by staff of the major funding body for his state organisation realising that it was apparently receiving

[4] These codes source the quotes to the study participant and the interview transcript. Interviews were numbered in the order in which they took place. L596 refers to the line number in the transcript of interview 20.

more funding but servicing fewer clients than similar bodies in other states. A second example was the work being undertaken by John in preparing briefings on the impact on the state of a new bi-lateral trade agreement.

One of the biggest challenges facing the policy and research workers was the diversity of views about the exact nature of the problem and about what represented a good, or at least a workable, resolution to it. For instance, in seeking to improve education outcomes for a group of disadvantaged children or to reduce anti social behaviour, there were no pre-established ways forward and no logical solutions based on objective assessments of what was needed. These circumstances made it necessary to reach agreement on the nature of the problem. Without this agreement, it was difficult to find accord on what constituted an acceptable solution. For Kate,

> one of the problems with the whole area is there's no consistent agreement on what it means or definitions […] different people have very different views on that. And um ...yeah so ...and even within the team itself at different stages until the very end there was differences of opinion (Kate, IV20, L478 - 97).

Carol was also conscious that 'there are too many other variables that will determine success … whether [the resolution] actually reaches fruition or not' (Carol, IV9, L204-5).

As they worked on their tasks and the related information seeking, the policy and research workers needed to keep in mind the different positions of clients and stakeholders. At times, not only were there diverse views and little agreement about the exact nature of the problem and possible resolutions to it, but also different client and stakeholder groups held opposing views on desirable outcomes. These views at times also conflicted with the aims of government at times, and so Gabi found that she had to

> tread a fine line between, you know, all these different stakeholders who had different views – well, in fact, they had relatively similar views that they were, you know, quite, um oppositional, or quite, um, opposing of it. And try and see how you, you know, how you could take their concerns on board and how you bring them along (Gabi, IV29, L445-9).

The existence of these different groups of clients and multiple stakeholders with competing interests and needs meant that uncovering and debating the assumptions underpinning problem identification, definition or resolution was complex and fraught. Kate, for example, confessed that at the outset she 'didn't know much about the field at all. And didn't realise what a complicated field it was, and complex and controversial' (Kate, IV 21, L166-7).

The lack of structure, the unclear or hidden assumptions and the existence of conflicting goals all added to the complexity of the problems that triggered the policy and research workers' tasks and information seeking. This circumstance was one of the main reasons the policy and research workers made such an effort at the beginning of the task to sort out, understand, sift through and clarify what they were being asked to do. In turn, this effort also helped them determine what information was needed for task completion, and eventually helped them in their judgements of enough information.

5.2.2 Using information to resolve problems

This description of how the policy and research workers sought and used information to help resolve these complex problems begins with consideration of their information needs. In addition to the domain- or topic-related information, such as community regeneration or the protection of native vegetation, used in preparing the work product that was the output of the task, the policy and research workers sought information to meet several other different kinds of needs. They needed information that could help them to understand the problem itself, to see how it fitted with the larger problem in which it was embedded and how it related to other problems, and they needed to find out how it might have been dealt with in a previous incarnation. They needed to know how clients, stakeholders and politicians viewed the problem as well as how they viewed any proposed solution being mooted. They needed feedback on their developing pieces of work. And because of the persistent interrelated nature of the problems, they needed to monitor their environment both for progress on current problems and for emerging problems.

In summary, the policy and research workers used information to:

- familiarise themselves with an unknown domain and make sense of the problem
- discover existing or previous positions taken on the problem
- assess how stakeholders, clients or politicians might view the problem
- assess how stakeholders, clients or politicians might receive the proposed solution
- gather the raw material they needed
- gather authoritative evidence
- feedback on the work they were contributing towards the resolution of the problem
- keep up to date with emerging problems and the progress of the current problem.

Familiarisation

When working in a domain or with a topic with which they were unfamiliar, the policy and research workers needed basic, lay information. They used this information as a point of entry into the unfamiliar domain or topic. When they found themselves in this situation, the policy and research workers often started with a broad web search: 'you just do Professor Google and up it comes' (Clare, IV1, L69). The search engine was seen as a very easy way to establish bearings in new areas, to get a feel for the major concerns and problems and to trace sources of more authoritative information. A second source of this kind of information was colleagues who were known to have experience in the area. This information was sometimes obtained during informal conversation with a colleague sitting at the next work station. At other times, contact was made slightly more formally via email or the telephone.

Even when working in a more familiar domain or with a familiar topic, the policy and research workers still needed to make sense of the problem with which they were dealing. For example, they needed to know why it was on the agenda and who was affected by the problem. For this kind of background, they again turned to colleagues and sometimes supervisors. They also accessed a range of web content such as the websites of public sector agencies, in their own or other jurisdictions, to see if and how other policy professionals had understood and dealt with the problem.

Previous positions on the problem

Because of the persistent nature of some of the problems, a critically important type of information about the problem for the policy and research workers was information about how their organisation or, the Government as a whole, had handled the problem previously. It was for this reason that they often started by searching for previous information about the problem held by the organisation in corporate records or working documents:

> we've got our own files and yes, I go back to past practices. That's the good thing about being a public servant, very little new, everything's been done before. And you can always find, you know, if you search Trim, or search our own group files, or even just go to the internet, and it will bring up stuff on the Department […] website – you can always find something that's happened before (Clare, IV1, L202-7)

However, while the corporate records or working documents would often reveal the official position on the problem, there was a need for other information of a more interpretive nature. For example, for Cath, working on an evaluation policy for her organisation's services, it was important to find out why the existing draft evaluation policy she had located had not been implemented. She also wanted to find out if the framework used in the draft was still the preferred approach for the public sector. This kind of information typically did not appear in corporate records. The need for this information would send the policy and research workers to their colleagues, especially those who had been in the organisation for some time or who were known to be good readers of the tea leaves. Carol for example started her information gathering by talking to a colleague 'who knows about these things (Carol, IV9, L99).

Stakeholder views on the problems or potential solutions

Stakeholder views on the problems contributed to the policy and research workers' understanding of the problems. In addition to understanding how their organisation and the Government viewed the problem, the policy and research workers needed to understand how clients and stakeholders saw both the problem and the possible resolutions. Several policy and research workers relied on field staff to gather local information from stakeholders or clients. For example, Tim 'went to […] our own staff […] the people in the, on the ground and in the field' (Tim, IV24, L71-72) to get one

perspective on issues associated with a legislative review. Others initiated original research to gather information from focus groups of clients, or feedback from industry groups or client groups. For example, one of Michael's initial tasks in preparing a draft strategic policy on forestry management was to carry out interviews with key industry stakeholders.

In some cases policy and research workers conducted this research themselves; in other cases, they commissioned the research from an external party. The policy and research workers also used the expert reference groups or advisory groups established by several of the organisations. Consultation with these groups was most often in face to face meetings, or through comments on early drafts of written documents. A final source of information used by the policy and research workers on client or stakeholder perspectives on problems or resolutions was the media, accessed by regular reading of newspapers, listening to the morning and evening radio broadcasts and in one case, explicitly using a media monitoring service to gather information on community perspectives about a problem.

All these different kinds of information – the information sourced via the web or from colleagues and needed to find bearings in an unfamiliar domain, the historical information found in the corporate records and the perspectives and opinions of clients and stakeholders – was useful for the policy and research workers as it helped them understand the nature of the problem and scope what would be an acceptable solution to that problem. However they also needed information as raw material or as a resource to be used in the completion of their tasks.

Raw material

The policy and research workers in the study gathered 'raw information' (Fiona, IV27, L154) in various forms including for example, facts and figures sources from scientific or statistical reports, and information about policies or interventions that had been implemented in other jurisdictions. Sometimes, this was quantitative data in the form of numbers such as how many people will be affected or how much will this intervention cost. The policy and research workers also needed information contained in published and unpublished documents, such as reports and journal articles, and policy documents

and instruments from other jurisdictions. For example, as Paul 'moved into I guess, formal policy making, formulating the regulation, um collecting information from other jurisdictions and overseas about what emission standards they set for similar pollutants in similar industries' (Paul, IV6, L13-5). These kinds of information, the facts and figures, and the background texts, were typically sourced through the web. Once the policy and research workers had gathered this raw material, they needed to turn it into information that was 'meaningful for our purposes' (Fiona, IV27, L154), a different kind of use.

Authoritative evidence

Raw material in the form of factual or background information was complemented by another kind of information. The policy and research workers also needed information to serve as authoritative evidence in their work, particularly when they were preparing formal discussion papers or research reports. It was for this kind of information that the policy and research workers most frequently sought out the academic literature. While they sourced some publications such as reports and journal articles through the web, it was this kind of information that they were most likely to source from the organisation's library or information centre, when there was one. However, even in those organisations with specialist information centres, the policy and research workers often started their searches on the web although as Kate noted: 'the idea of having to search on the internet, like it's normally such a no-no!' (Kate, IV20, L670-1). Before she finalised her report, however, Kate asked library staff to source references for her, to make sure she had 'some good backing for what [she was] saying' (Kate, IV21, L142). Those policy and research workers who did use library or information centre staff to gather information commented on the difference in the experience of doing their own searching of databases and having the searches done for them. Barbara observed 'there's always that sort of process of discovery where you, even just something as mechanical as a database search you put terms in and you just get to see in front of your eyes what pops up' (Barbara, IV18, L137-9).

The policy and research workers found sourcing the published information straightforward, albeit sometimes time consuming – 'that's the easy stuff, the published stuff' (Ron, IV33, L328-9). Locating the unpublished information was less

straightforward. For example, as Naomi worked on specifying and defining data sets required to model the impact of changed funding arrangements for public housing, she found that she needed access to a range of different kinds of information from different sources – from internal records about the Department's clients, to profile information and published figures on specific groups in the population, such as indigenous Australians. There was 'absolutely no one set of information' (Naomi, IV 30, L 229) that would help them, so Naomi and her team had to source information about the Department's target groups from a number of sources, including commissioning additional research from external bodies and drawing on 'existing knowledge' (Naomi, IV 30, L 267) held by members of the team.

Feedback

Confirmational information use was described by Taylor as to do with the 'need to verify' (Taylor, 1991, p 230).As they gathered the facts, the figures, the background information and the evidence they needed, and worked on preparing early drafts of the work, the policy and research workers drew on three main sources: different people in different roles; the web; and the corporate record of what had happened before with the problem. While accessing information from the web or the corporate record was straightforward, 'relatively mechanical' (Tim, IV 24, L201), as noted earlier in this section, drawing on people as sources of information presented more of a challenge.

The policy and research workers sought feedback from colleagues, supervisors and sometimes from reference groups on how well they were meeting the task need. Colleagues, supervisors, senior staff and associates all provided different kinds of information to the policy and research workers at different times. When purposefully seeking information as raw material, the policy and research workers sometimes did not know which person to make contact with: 'that's possibly been the largest learning curve I've had in my ten months here, nine months here is where to get the information from, because, as with, I think any organisation, most of it's kept in people's heads. And um, it's what head you've got to chase up' (Michael, IV25, L152-5). In other instances, colleagues in their own organisation or associates in other organisations were reluctant to share because they did not want to see the information used in a manner different from originally intended or because they felt it might portray their organisation

in a less than flattering light. At other times, it was simply that the person with the information did not know someone else needed it:

> the hardest part in it all was finding the information. Because people tend to, to – not to hide it – but they, they're very – they squirrel it away and they don't really know the value of what it is, if it's – as I was saying before, they collect it for a particular purpose, but somebody else can turn that into something really valuable if they know it's there (Ron, IV33, L316-9).

Monitoring

Another example of using information for enlightenment purposes was the ways in which on an ongoing basis, the policy and research workers sought and used information both to gauge responses and reactions to current problems and proposed solutions, and to alert them to emerging problems. They wanted to find out about new, different or expanded perspectives on the problems they were dealing with, and they wanted to find out about any changes in the political position on the problems they were dealing with. On a longer term basis, they also wanted to be aware as soon as possible about any new problems on the horizon. Meeting this information need meant the policy and research workers were constantly scanning for information about the current or emerging problems, using all the sources and resources available to them. They checked websites of public sector agencies, in their own and other jurisdictions, as well as the websites of industry groups. They stayed in touch with colleagues and supervisor to keep up to date with the current position on the problem. The policy and research workers also monitored media reports and stayed in touch with problems via formal and informal professional networks. This scanning activity was sometimes carried out via email, and at other times, in person, either one-on-one or in meetings. For example, Alan made a point of attending many meetings, not only because of the content discussed but also because he could pick up pointers about which way the wind was blowing: 'It's this continually attending all sorts of meetings internal and external and in a way, it's a matter of being able to be aware of the context so that when we're … when we ask somebody to write a paper or write a draft response, or briefing or so on, to fill it in and give them the bigger picture as best I can' (Alan, IV2, L212-6).

In summary, the policy and research workers in the study needed information that could help them understand the problem itself, see how it fitted with the larger problem in which it was embedded and how it related to other problems. They also needed to find out how it might have been dealt with in a previous incarnation. They needed to know how clients, stakeholders and politicians might view the problem as well as how they viewed any proposed solution. The persistent nature of the problems meant that information on how the problems had been dealt with previously was a valuable resource. Because of the persistence of the problems, the policy and research workers devoted much of their time to monitoring the landscape, seeking to keep up to date with the evolving problems so they could be prepared should the problem re-appear on the agenda. The need to understand different perspectives and interpretations of the problems sent the policy and research workers to a number of different sources, in the form of colleagues, supervisors, stakeholders and clients.

Domain- or topic-related information, such as information about community regeneration or the protection of native vegetation was used by the policy and research workers in the study in preparing the product that was the output of the task. They needed feedback on their developing pieces of work. Because of the persistent interrelated nature of the problems, they also needed to monitor their environment both for progress on current problems and for emerging problems.

5.3 Setting

Regardless of how policy is conceptualised and formulated, governments seek to implement public policy through the public sector administration (Bridgman and Davis, 2004, p. 11). The departments and agencies which employ policy and research workers are established and modified in an effort to bring order and coherence to the pursuit and achievement of particular policy objectives. The term bureaucracy is almost synonymous with the routines, the red tape and imperatives for due process that characterise the public sector. However, just as policy itself is dynamic and contestable, so too are the structures deemed most appropriate for delivering policy outcomes (Colebatch, 2002, p. 23, p. 26). One result is that organisational change in the form of

restructures, mergers into super-departments and subsequent de-mergers, has become commonplace in the state public sector in which this study was conducted.

In part because of these constant organisational changes, policy and research workers spend much of their time building and maintaining relationships with counterparts both within their own departments and agencies and across organisational boundaries (Colebatch, 2002, p. 117). This relationship nurturing occurs through a range of formal and informal interactions with one major objective being 'to communicate to the other participants the policy perspective of the organization, to discover what their perspective is, to identify where the positions of the participants are in conflict and to seek paths to agreement' (Colebatch, 2002, p. 117). So in addition to drawing on more formal sources of information described earlier in this section, policy and research workers spend much of their time in dialogue with other players and stakeholders in the policy process, seeking a common understanding of what is relevant to the policy issues under discussion.

The policy and research workers in the study were employed by 11 different organisations, representative of several different types of public sector organisations and providing a range of different types of services. Seven of the 11 organisations were very large organisations. Two of the 11 were independent commissions, one set up to fill an advocacy role, and the other with both an advocacy and a monitoring role. One of the 11 was a small office providing support to a regulatory body and the last of the 11 organisations was a smaller agency with the role of developing business across the state. Despite these differences in role and size, all 11 organisations were operating as bureaucracies, characterised by specialization of functions, adherence to fixed rules, and a hierarchy of authority. More detail on the organisations and the services they offered is provided in *Table 4.1*.

The bureaucratic nature of the organisations in which they worked affected the information activities of the policy and research workers in four ways:

- by constraining their communication options, especially with senior staff other than their own direct supervisors

- through the timeframes that shaped the tasks
- through the organisational approach to risk and uncertainty.

5.3.1 Constrained communications

The bureaucratic nature of the organisations in which they worked constrained the policy and research workers' options for using channels such as personal communications. Some policy and research workers reported they were unable to communicate directly with senior staff whom they felt might have provided information to them, either because of explicit policies on communication with senior managers or because of unwritten rules that prohibited this kind direct contact. Michael, relatively new to the public sector, observed: 'I want to go and see the – I think I should see the Director General about this point, I want to know something. 'Oh well, write it down and we'll put it through'. And two weeks later, you might get an answer' (Michael, IV25, L525-8).

The bureaucratic style also constrained communications in other ways. In several instances, the information being sought by the policy and research workers was actually held elsewhere in the organisation. However, the policy and research workers only discovered this by accident or after more formal channels of information seeking had been pursued. For example, Tim had a literature review carried out by staff in the library which turned up a number of useful reports. One report, he was surprised to find, was written by a staff member in another division of his organisation. This was particularly problematic for Ron who found that 'people [in other parts of the organisation] had information that they didn't know was useful to us and we had no way of finding out that they had it' (Ron, IV33, L329-40).

5.3.2 Timeframes

Although policy analysts work to sometimes tight and immovable deadlines, and rarely have sufficient time for a thorough analysis of all alternatives, the deadlines can often be re-negotiated (Feldman, 1989, p. 85). The apparently tight but really often elastic timeframes for completing tasks, observed by Feldman, were also apparent in the policy and research workers' organisations. The policy and research workers often found

themselves preparing a 'quick dirty brief' (Molly, IV7, L228) to get to their supervisor in the space of two to three hours. However, in spite of the importance of the deadlines, they were sometimes seen as 'quite artificial' (Gabi, IV31, L451) or 'rubbery' (Robert, IV32, L436), and often could be extended if necessary: 'But also, I think surprisingly even though you do have a deadline, often you can actually extend that deadline […]. It's often negotiable.' (Cath, IV 15, L543-4). As well as the deadlines for particular tasks, the policy and research workers were aware of the affect of time on a different scale. As Michael commented:

> incremental change is what it's about. And just be willing to keep running it up every so often. You know, if you run something up and get a little bit, you know, two, three, four years time, change it a little bit, answer their concerns previously, run it up again, get a little, another increment. Yeah, that's the way it goes (Michael, IV 25, L201-04).

5.3.3 Approach to risk and uncertainty [5]

The increasing recognition of the complexity and ambiguity that characterises the policy making process was discussed in *Section 5. 2: Problems and problem resolutions.* However, very little research has been undertaken on how those involved in the process respond to the ambiguous and uncertain contexts in which they carry out their work (Colebatch, 2002, p. 121; Rich, 1991, p. 321).

The participants in the study were aware of different kinds of risk and uncertainty as they worked on and completed their tasks. At times, the risk was a political one. Tim was aware that: 'you need the, you, you've always gotta keep in, in your mind, a risk profile. The sense of, you know, likelihood and consequences' (Tim, IV24, L490-1). He was aware of the likely implications if he made a poor judgement:

> But you've also got to keep it in perspective ... and that's, that's one element of risk that's really important. So where are we actually on this scale, you know. If I put this paper out there, is it, you know, what's the worst damage? Oh, you know, […] the minister'll end up, you know,

[5] Taylor originally positioned attitude towards risk as an attribute of the individual actor. However, this element of the IUE is discussed in this study in parallel with the findings on organisational style because the bureaucratic style appeared to build in capacity to manage risk in a way that minimised the responsibility felt by the individual policy and research workers

> doing a couple of media things to calm the problem down. It's not that big. Do I want that? No I don't (Tim, IV24, L502-6).

For others, there was a risk that a mistake or a wrong assumption made by them could impact adversely on their clients. For example, Naomi described how she was

> scared that yeah, that, that something I've done is um, I've completely left off a major assumption. And that it's now in this incredibly sort of, public policy, that's been implemented and some um, poor single Mum with three kids is going to be charged a rent way beyond what she can possibly afford because I haven't factored in this particular thing (Naomi, IV30, L390-3).

The responses of the policy and research workers to this kind of risk are reported in more detail in *Section 6.2.3: Organisational style and structure*.

5.4 Decision processes

Contrary to the rational choice model of decision making, discussed in Chapter 2, Colebatch challenges the view of a group of authoritative decision makers directing public policy interventions, arguing that it is difficult to isolate the 'articulate conscious choice' (Colebatch, 2002, p. 15) implied by this view. Rather policy making is better depicted as a process involving a variety of different participants in the process of constructing and sustaining policy (Colebatch, 2002, p. 4), a process in which there are 'few predictable steps and many surprises' (Stewart, 1999, p. 5) and from which policy decisions emerge (Edwards, et al., 2001, p. 6). There is a point in the policy flow at which an individual (in Australia, the departmental Minister of the Government) or a group (the Cabinet) does make a decision in the form of a commitment of resources towards a particular policy intervention. However it should also be acknowledged that at times, these senior policy makers choose to avoid making a decision, either for political reasons, or because they are dealing with wicked problems, those issues that 'cannot be settled and will not go away' (Bridgman and Davis, 2004, p. 45).

The work of policy analysts is rarely used directly by these policy makers for decision making, because in part at least, 'the kind of papers they produce are generally not useful for decision making' (Feldman, 1989, p. 13). However, when thinking about the

uses to which the information sought by policy and research workers is put, uses such as enlightenment, understanding and interpretation, it becomes clear that research findings gradually surface through policy networks and communities (Weiss, 1977), taking shape in written papers as the policy and research workers frame issues and interpret and filter the information needed to understand both the problems and the potential resolutions.

Several policy and research workers commented on the bureaucratic nature of the decision making processes in their organisations. Barbara, at the time of interview only recently appointed to a position in the public sector, was very aware of the style of decision making:

> But it seems to me that's actually now, now it seems to me that that's actually just a, a built-in part of how things work that, the manager won't make the decision about what he or she wants until they've seen the first draft. And that will help them crystallise their opinion of what they want. And that process will go on and on as it gets handed further up. And so, sort of built in to the whole process of getting information around here is, is um ... reiteration of work that you'll do something, hand it up, get it back, do it again, hand it up, get it back. And that helps to define the kind of purpose and scope of, of some of the projects. (Barbara, IV18, L574-81).

5.5 Tasks

Task is one factor that has emerged in empirical research as a strong influence on information seeking behaviour in the workplace. While the IUE model skirted around the role of task as a factor in information seeking and use, Taylor's tentative classification of information uses and traits is suggestive of task (1991, p. 221) in that some work activity or task is required to incorporate for example the located quantitative data (information trait in the model) into a work product for some kind of factual or confirmational use (information use in the model).

For policy analysts, the business of policy work involves canvassing and monitoring issues, agenda setting, carrying out secondary research, analysis and synthesis, and dissemination of information for consultation and decision making. Policy analysts monitor the external environment to identify emerging issues, sometimes undertaking

original research for the same purpose or to gauge reaction to proposed interventions. The tangible output of their work is written papers, briefing, discussion and issues papers that inform the deliberations of the senior policy makers (Feldman, 1989, p. 27).

The tasks required of policy analysts are typically complex ones for which neither the information needed nor the outcomes required can be specified at the outset (Bystrom and Jarvelin, 1995, p. 194). For example, in preparing an issues paper, a policy and research workers will need to understand how the issued should be defined (Bridgman and Davis, 2004, p. 45), which stakeholder perspectives should be represented, the previous positions taken by the organisation on the issue, and outcomes of previous interventions in the area. Although a similar process is followed for each issues paper, none of this information can be specified ahead of task assignment, nor can it usefully be codified into a simple routine.

As anticipated, the policy and research workers in the study found it extremely difficult to distinguish the information seeking subtasks from broader critical incident tasks. The critical incident tasks in turn were often one part of larger more complex work tasks aimed at resolving a particular problem. *Table 5.2* shows the nature of these inter-relationships as treated in the thesis. The example comes from case seven, Nancy's judgement of enough information.

Table 5.2 Relationships between problem and task

Problem	Larger Task	Sub Task
Corrupt behaviour in the public sector	Develop corruption risk profile for public sector organisations	Consult with stakeholders
		Develop issues paper as basis for consultation
		Write report on desk research conducted to inform the issues paper[a]

a Critical incident task in which information seeking and use, and judgements of enough information embedded.

In some cases, the tasks undertaken by the policy and research workers were intended to help interpret or clarify an acceptable policy response. For example, Robert was concerned about the lack of understanding in his organisation of key concepts in the

domain of community sustainability. His discussion paper was intended to raise awareness among his colleagues. In other cases, the tasks were a part of the problem resolution. An example was the guide book and resource kit prepared by Alison and her colleagues which was one part of a larger education program aimed at reducing corruption in public sector organisations.

In a number of instances, these larger tasks had begun before the study participants became involved in the work. Some tasks had been temporarily placed on hold for a period of time and had been recommenced at the time of the participants' involvement. For example, Nancy, assigned the task of preparing a research report on a long running issue for the organisation, explained that this task had recommenced with her appointment at the organisation because of the particular skills and experience she brought to the organisation.

Kate's critical incident task was another example of the tasks that were part of a larger project. Kate's organisation had initiated an investigation into statistics on child deaths in the state, carried out with the intention of benchmarking the data against that of other jurisdictions. The gathering of the statistical data was 'already happening' (Kate, IV20, L596) when Kate became involved. Her critical incident task was initiated when an expert reference group decided to ask for additional comparative statistical analyses. Before the reference group could do the additional analysis, better data collection was needed. And before that could happen, data definitions needed to be made consistent. The reference group had begun gathering information for a research report on definitions and Kate's critical incident task was to complete that research report, which would provide information to enable robust data definitions for use in the databases. Kate felt the reference group had got lost in the detail of the various aspects of the larger project and her task 'was already a mess' (Kate, IV20, L596). Kate had no time to orient herself to the subject matter as she would normally do when starting a research report. It was 'just straight in, you know, um – and trying to come up with some solutions without really knowing what you're dealing with' (Kate, IV20, L602/3). *Table 5.3* provides an overview of the critical incident tasks in the study as whole and the larger tasks in which they were embedded.

Table 5.3 Relationship between larger and critical incident tasks

Case No (Participant)	Larger Tasks	Critical Incident Tasks
1 (Clare)	Submission to a Court challenge on funding for education	Briefing paper (for Minister)
2 (Alan)	Background briefings for a cross-jurisdictional Ministerial forum	Briefing paper (for Minister)
3 (Paul)	Legislation (review of existing legislation on air quality)	Discussion paper for community and industry consultation
4 (John)	Background briefings for a cross-jurisdictional Ministerial forum on trade arrangements	Briefing paper (for Minister)
5 (Molly)	Guidebook on worker protection	One chapter
6 (Carol)	Cross-jurisdictional court submission on industrial relations issue	Submission on the state's position
7 (Nancy)	Development of corruption risk profile for the public sector	Report on research into corruption risks in the healthcare sector
8 (Alison)	Guidebook on corruption prevention	Section on corruption prevention practices.
9 (Cath)	Operational policy for program evaluation (internal)	Policy document
10 (Quentin)	Investigation into causes of differential statistical reporting on funded disability services	Report on causes of the differential reporting
11 (Ryan)	Inquiry into ways to improve educational outcomes for a particular group of disadvantaged children	Report on findings from a literature review
12 (Barbara)	Development of new policy direction in education	Report of a systematic review of research findings
13 (Vita)	Submission to external agency on the impact of guidelines for young drivers	Submission
14 (Kate)	Statistical analysis of causes deaths in children	Report on findings from a literature review (one of 5 parts of the project)
15 (Tim)	Legislation (review of existing legislation on forest management)	Discussion paper for community and industry consultation.
16 (Ron)	Legislation (new) to manage native vegetation	Decision support model and tool, for capturing data on changes in native vegetation
17 (Michael)	Public policy on management of forests	Draft strategic policy for industry consultation
18 (Fiona)	Legislation (new) on safety for mine workers	Discussion paper for industry consultation
19 (Robert)	Investigation to establish the public housing communities with the greatest needs	Discussion paper to share expertise about key concepts in the domain with colleagues and supervisors
20 (Gabi)	Public policy on management of anti-social behaviours in public housing communities	Briefing paper (for Minister)
21 (Naomi)	New funding model for public housing	Quantitative data model, for modelling impact of the changes resulting from the new funding arrangements

5.5.1 Types of critical incident tasks

The 21 critical incident tasks discussed by the study participants were grouped into seven different types. The seven types of critical incident tasks during which the policy and research workers made their judgements of enough information are shown in *Table 5.4*.

Table 5.4 Types of critical incident tasks

Type of task	No
Research report	5
Discussion paper for consultation	4
Briefing paper	4
Submission	2
Policy	2
Guide Book	2
Data model	2
Total	**21**

Of the seven types of critical incident tasks, five were well-established work practices in the public sector and so the creation of the finished work product followed a structured path. These critical incident tasks were the research reports, discussion papers, the briefings, the submissions and the policies. The skills needed to complete these critical incident tasks were part of the toolkit of experienced policy and research workers. The remaining two critical incident tasks, building data models and preparing guidebooks, were also not uncommon activities in the public sector. Indicative examples of the seven different types of critical incident task are described in the following section.

Critical incident task type 1: Report (Case 7)

The critical incident task for Nancy was the preparation of a report based on desk research and intended to contribute background to an issues paper. The larger task for Nancy's research report was a major initiative to develop a corruption risk profile across all public sector organisations. Nancy was focusing on the health sector, where she had particular expertise. As part of this work, Nancy had a number of subtasks to complete, including consulting with stakeholders, analysing internal data on complaints received and the development of an issues paper on corruption risks in the health sector. Nancy had been working on the issues paper on and off for some 15 months. The work had

been delayed as a result of a major restructure of organisations in the health sector; this restructure resulted in the issues paper being put on hold for a period.

Critical incident task type 2: Discussion paper for consultation (Case 15)

The critical incident task used by Tim to embed his judgements of enough information was a discussion paper prepared as part of a regulatory review, a process of Government which, in this jurisdiction, follows a standard course in this government jurisdiction. Discussion papers are a way of stimulating and focusing debate on a range of matters associated with a particular issue and they are often released as part of an inquiry or a regulatory review to gather feedback from communities or industry groups on proposed changes. In this case, Tim did some of the information gathering and analysis himself as well as assigning some of the information gathering to staff members. As a senior manager, Tim also had the responsibility of deciding when the discussion paper was ready to be released for public scrutiny.

Critical incident task type 3: Briefing paper (Case 20)

Gabi's critical incident task was the preparation of a briefing paper requested by a newly appointed Minister. In the public sector, a briefing paper is a short document intended to provide a succinct overview of an issue or topic, usually for senior executives or politicians. Briefings are often structured around several standard headings: issue, background, comment, and if necessary, recommended action. This briefing paper was part of a larger task to develop and implement strategic policy on managing anti-social behaviour in public housing estates. This larger task had commenced before Gabi had arrived in the department. Although she had little existing knowledge of the topic, Gabi was assigned several sub tasks as part of the larger task. These sub tasks included the briefing paper, the preparation a Cabinet Minute and the writing of a scoping paper on anti-social behaviour policies in the UK and how they might translate to this state.

Critical incident task type 4: Submission (Case 13)

Vita's critical incident task was writing a submission for an inquiry in response to another organisation's decisions about guidelines for young drivers. Public sector

organisations often contribute submissions to inquiries as a way of representing the views of their client groups. The submission will set out that point of view and substantiate the position taken by the submitting organisation. In this case, the state organisation which regulated traffic rules, had announced it was reviewing guidelines for young drivers and planned to bring in reforms aimed at improving the road safety of this group. Staff in Vita's organisation could see the proposals were detrimental to the well being of young people and immediately decided to prepare comment on the proposals. At the same time the traffic organisation announced it would release a discussion paper and Vita was given the task of preparing her organisation's formal submission in response to that discussion paper.

Critical incident task type 5: Policy (Case 17)

The preparation of a draft policy was the critical incident task discussed by Michael. The larger task was the development of a strategic policy for managing the state's forests as a productive, profitable and sustainable primary industry. Michael worked in a team of three, with the other two team members being from another organisation. Each team member worked on a different aspect of the project. Michael carried out consultation interviews with representatives of key stakeholder groups, conducted a literature review and then prepared a draft policy for consultation with an industry advisory body.

Critical incident task type 6: Guide Book (Case 8)

Alison provided two critical incident tasks associated with the preparation of a guidebook. One critical incident task was preparing a section of the text providing guidelines for corruption prevention practices. The larger task was the production of a resource kit to help agencies manage a particular aspect of potential corruption. This task arose from an analysis of an international benchmarking study of corruption prevention in OECD countries. The guidebook was one part of the resource kit. Alison worked on the project with a team from her own agency, and with a second team from another state jurisdiction. The two teams brought complementary skills and expertise to the project.

Critical incident task type 7: Data model (Case 21)

Naomi's critical incident task was the building of the data set used to model the impact a number of different policy options. Naomi was the manager of a small team which carried out research and data analysis to support policy development. Acknowledging that the current funding model for public housing in the state was no longer sustainable, the Government initiated a review of the funding arrangements. Naomi's critical incident task was to develop a data model to enable modelling of a number of scenarios, testing how different groups of clients would be affected by the different approaches under consideration. Although she was a manager, Naomi had a very hands-on role. She needed to be closely involved in translating the needs of the policy development team into 'something very tangible' (Naomi, IV30, L116) the statisticians and geographers could work with. Naomi's work culminated in the 'needs data set' (Naomi, IV30, L335).

5.5.2 Uncertainty about the critical incident tasks

The policy and research workers talked about the lack of clarity and the resulting uncertainty that confronted them as they began work on the tasks and the associated information seeking. This lack of clarity came about because critical dimensions of the tasks were often vague and unstructured although the process to be followed during the critical incident tasks was often structured.

In some cases, the policy and research workers found their task objectives were unclear as a result of supervisors not being explicit about these objectives.
One policy and research worker was left 'feeling a little bit unsure about exactly what is was I was being set to do because it was such a broad topic' (Cath, IV15, L178-9). Another policy and research worker, Michael, became aware as he started gathering information, that a lot of work had already been done in the preparation of the policy he was being asked to develop but the policy itself had not been implemented. Michael could not understand why he was looking for more information when so many documents and reports had already been written. He was frustrated by not having clear guidelines about the relationships between his critical task and previous work; he felt such guidelines would have set him an unambiguous direction for the task.

In other cases the objectives were unclear for other reasons. Vita for example had to begin work on drafting a response to a submission before the discussion paper, a key framing document, was available. In another case the factors contributing to the unclear objectives were to do with changing circumstances such as the arrival of a new Minister, bringing with him different views on what should or could be done, a change which turned the task and the information seeking into a 'moveable feast' (Gabi, IV31, L312).

Another cause of uncertainty about the critical incident tasks came from lack of clarity about the scope of what was required. One policy and research worker reported that at the outset she: 'didn't know basically what the scope of the work that needed to be done' (sic) (Alison, IV12, L62-3). While the stated position of the organisation on a particular issue was often used as a guide on what points to cover and so, what information to gather, one policy and research worker found himself preparing a briefing on a issue on which his organisation had both a publicly stated position and an unstated one as well:

> the government's public position is that NSW does not support it. So that much is clear. But because things are happening which we're being asked to respond to, you can't just keep saying: we don't support it and therefore we're not going to play. You have to look at … what's happening is the Commonwealth's commissioned ACER to look at various options and they're trotting around talking to different stakeholders about what the implications of different options are so you're really in a position where you have to be able to resound to different options (Alan, IV3, L75-81),

This ambiguity led to uncertainty for Alan about how to find a balance in his briefing between the two positions. Without clear objectives and scope, the related information seeking was difficult because the policy and research workers found themselves 'second guessing' (Alan, IV3, L74) what coverage was needed and therefore what information they needed.

However for some policy and research workers clear objectives were provided but were apparently misunderstood. Barbara, for example, felt that her supervisor had not clearly understood the task assigned to her (i.e. the supervisor) which she in turn assigned to

Barbara. Barbara felt this misunderstanding came about because: ‘it was basically a kind of, I think, miscommunication of what was needed’ (Barbara, IV18, L64-5).

Chapter Conclusion

This chapter has described the information use environments of the policy and research workers who participated in the study, providing a rich portrayal of the contexts within which they sought and used information and made judgements of enough information.

In summary the policy and research workers were eclectic in their use of various media, channels and sources of information to meet a range of different information needs for different purposes throughout the process of completing their work tasks. In particular their work and professional networks were important sources and channels of information. The role of these networks is examined more fully in the next chapter.

The ‘never ending jumble’ of problems and potential resolutions observed by Feldman (1989, p. 89) was apparent in the information use environment of the policy and research workers. The policy and research workers used information in different ways when working on the critical incident tasks aimed at problem resolution. A major challenge confronting the policy and research workers was the need for information that would help them interpret and understand the political landscape in which the problems and the critical incidents that triggered their tasks were located.

Related to this need for interpretation of the problems and the tasks was the need to gather information on the different perspectives and understandings of the problems. Seeing the problems from these different perspectives helped the policy and research workers to understand more precisely the nature of the problems and the tasks assigned to them and so what information was needed to complete the tasks. Information on previous positions taken by their organisations on the problems was another aid in understanding the problems.

Aspects of the organisational setting in which the policy and research workers worked that were revealed by the IUE analysis were communications channels, timeframes given for tasks and the organisational approach to risk and uncertainty. Decision making

processes in the organisation were also an important element in the IUE of the policy and research workers. The process of sending draft work products to supervisors for comment and feedback was a technique that helped supervisors to clarify the task requirements. Repeated cycles of preparing drafts, seeking feedback and revising the drafts resulted in a kind of diffused responsibility for the decisions about the critical incident tasks.

The policy and research workers carried out a range of critical incident tasks all of which were intended to be used in resolving problems and the tasks themselves were also an important element in the policy and research workers' IUE. However the policy and research workers found it difficult to separate their information seeking activities from the critical incident tasks in which their information seeking was embedded.

The description of the IUE of the policy and research workers in the study has revealed the contexts in which the policy and research workers sought and used information and made judgements of enough information to be volatile and ambiguous. The policy and research workers worked on critical incident tasks aimed at resolving complex problems that were often long-standing. The tasks required the policy and research workers to source information through a range of media and channels and they used the information for different purposes while completing the tasks. This description of the policy and research workers' IUE contextualises the findings on judgements of enough information that are presented in the next chapter.

Chapter 6

Judging enough information: Process and influences

Study findings are presented in two main sections. In the first section the findings on how the policy and research workers made their judgements of enough information are reported. In the second section findings on the influences on those judgements are reported.

6.1 Judging enough information

The ways in which the policy and research workers made the judgement that they had enough information was often less than visible to them: 'it's something […] that you just do, but you don't really think about it' (Cath, IV15, L681). The words they used to describe how they judged enough information frequently linked back directly to the embedding work task rather than the information seeking activity. However from the analysis four key themes emerged that characterised the experiences of the policy and research workers as they made judgements of enough information. These themes were the:

1. Development of mental representations or templates of the tasks against which the judgements of enough information were made
2. Iterative nature of the process of judging enough information
3. Fluid nature of what constituted enough information
4. Collaborative nature of the judgement of enough information.

In this section, findings are presented on each of these four themes. The section concludes with a rich description of one of policy and research workers' assessment and reassessment of enough information.

6.1.1 Enough for what? Mental templates against which to judge enough information

One striking theme to emerge from the data was the necessity of having something against which to judge when enough information had been gathered. The policy and research workers themselves spoke of developing and using 'frameworks' (Quentin, IV15, L326), or of needing to establish 'parameters' (Michael, IV27, L100). As well, they referred to needing a 'reference point' (Carol, IV9, L4) for their information seeking activities. When making judgements of enough information they recognised that they had the parts of a 'comprehensive picture' (Gabi, IV31, L354) or the 'componentry' (Ron, IV33, L453) they needed.

These labels were all attempts to make visible different parts of what was a cognitive representation of what information was needed to complete their tasks and how the different pieces of information fitted together. However the policy and research workers themselves did not speak of the cognitive representations of the tasks and the information needed as a whole. The representation of the critical incident tasks was inextricably intertwined with the information needed and the term *mental template* is used to signify the totality of the cognitive representation against which the policy and research workers judged whether or not they had enough information. The term *mental template* was chosen for particular reasons to describe the concept as it was revealed in the data and a rationale for the use of term appears in the Glossary in *Appendix One*.

The importance of these mental templates emphasised the close relationship between the tasks and the judgements of enough information. Indeed, for the policy and research workers, enough information had more to do with the nature of the critical incident tasks than with information itself. In many cases, the policy and research workers needed the mental template before they even began looking for information. However, the mental template was also essential at the end of the task as well because it was against this mental template that the policy and research workers made the judgement they had enough information.

The terms used by the policy and research workers to describe the mental templates had two elements. Firstly, there were the frameworks and parameters that set boundaries

around the task and the information needed. Quentin found that 'once [he had] a framework [he] picked up the evidence to support this statement' (Quentin, IV15, L347-8). Secondly, there were the constituent elements, the 'componentry' (Ron, IV33, L453) that constituted the key points within the parameters that bounded the mental templates. Sometimes, although the mental template dimensions were very clear, those constituent elements were unclear and appeared as a 'blank sheet' (Fiona, IV27, L111-2). At the outset, Kate found herself working without any reference points and described the experience:

> it was a bit daunting there um, in the early stages, talking to different people with very different views. Yeah. Um, yeah just with a few, few – whose opinion you should um, tsk, or where to sort of place people. You know, you don't sort of have any reference points, they're all experts (Kate, IV21, L174-91).

Policy and research workers described this aspect of the task and information seeking process as akin "to form[ing]a picture" (Molly, IV 9, L 19) or completing a puzzle. Often the puzzle pieces were conceptualised as questions in the minds of the policy and research workers. Pieces of information filled in 'one part of that puzzle' (Nancy, IV12, L108). As Nancy explained:

> And so once I felt that I had explored that sufficiently, and I wouldn't … sufficiently is the word, not comprehensively I don't think for all of them. But um … for the purposes of answering the question or informing, giving me a feel for where we needed to go with it. (Nancy, IV12, L491-99)

Together the frameworks and parameters and the componentry and the parts of the puzzle therein, became a kind of mental template of the task which provided a 'comprehensive picture on a range of the kind of important issues within the topic, I s'pose' (Gabi, IV31, LL354-5), a mental template of what information was needed to complete the task. As Cath describes the experience:

> I had my framework for the policy, and so you know, it was really, you know, did I have enough information to be able to write that bit of it and then that bit of it and, yeah or could I um, could I ...and could I substantiate you know, why I've put those things in or, or justify the need for it or yeah or the mmm. So you had to be able to uh, if people

> asked you ‘well why have you done that?’ or ‘why’ve you put that in?’ you have to be able to answer those questions. (Cath, IV15, L381-6**)**

The work on the critical incident tasks continued, piece by piece, as the policy and research workers worked to complete the picture they held in their minds. Nancy described this experience: ‘you can say, ok, yeah, we’ve got that, we can look at this – yeah, and that gives you a point to move from as well’ (Nancy, IV12, L108-12). The policy and research workers prioritised these constituent elements and often felt that they had enough information when they were confident that the essential elements had been adequately covered.

The policy and research workers recognised the importance of having this mental template of the task, but did not always find its development a straightforward exercise. In some cases, when the task was assigned, the policy and research worker’s supervisor provided some guidance. One policy and research worker always tried to get the person assigning the task to ‘actually give a position’ (Molly, IV9, L267-8) on what should be covered in the task, knowing that without this information, she may end up doing a lot of work ‘for nothing’ (Molly, IV9, L268).

Often, however, no framework or elements were provided or suggested by the supervisor requesting the task, nor was the purpose of the task made clear at the outset:

> so there was not a lot of guidance, so it was, yeah, I s’pose it was a little bit unsureness as to what the project actually was and what was required. Yes that was probably the initial feeling (Cath, IV15, L180-2).

In these situations, the policy and research workers formulated their own understandings of the purposes of the tasks and these understandings provided the guidance they needed. Carol for example started her information gathering by talking to a colleague ‘who knows these things’ (Carol, IV 9, L 99), looking for a ‘reference point’ (Carol, IV 8, L 43) from which she could develop a position. As a way to move forward in developing her understanding of the task, Carol called on her colleagues. They started with existing source documents and then brainstormed what they felt the government might want around issues that could be covered in the policy being developed. This need to frame both task template and information seeking was recognised by Cath: ‘in a

way, it depends what's driving the collection of inform- … well, it always depends on what's driving the collection of information' (Cath, IV12, L452-4).

The process of developing a mental template took place regardless of the policy and research workers familiarity with the subject domain. However, the policy and research workers did find it was more difficult to formulate a mental template of the critical incident task when working in area in which they did not have domain knowledge, or knowledge which gave them a 'broader schemata' (Fiona, IV27, L329) in which to situate the new information they were gathering. In the cases where they had little or no domain knowledge, their first step was to seek out information to help them tease out the key issues and to clarify the organisation's current position on those issues. The organisation's goals also provided clues when no explicit framework was provided. For example, tasks were approached with a 'general understanding' (Kate, IV21, L667) of the organisation's view on policy matters, an understanding that helped sort through what points would be important. Often the mental templates were negotiated with colleagues or with supervisors, a characteristic of the process which is analysed in detail in *Section 6.1.4: Collaborative process of judging enough information*. Clues from supervisors and colleagues and knowledge of the organisational position on issues all helped the policy and research workers to formulate an understanding of 'what counts […] and what doesn't' (Ryan, IV18, L201-2) when it came to determining what constituted enough of the required information.

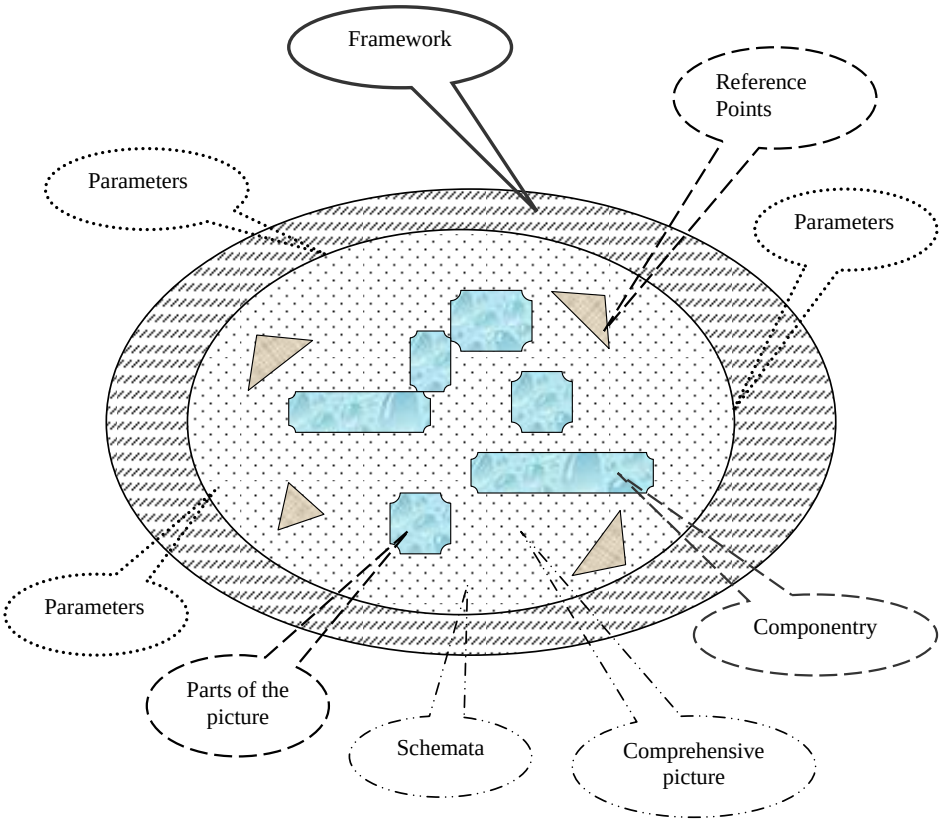
Once the mental template had been formulated, however, the task and the associated information seeking became easier. After having started with what looks like a 'hotch potch of different things' (Kate, IV21, L370), policy and research workers worked on 'refining and sharpening' the information until they were in a position to say 'yes, that meets the issue, that gives us an answer we can work with' (Fiona, IV27, L29-30). The information that was needed became clearer as well: 'I had my framework [so it was] did I have enough information to write that bit of it, and could I substantiate why I put those bits in?' (Cath, IV15, L381-4).

The mental templates were also critically important at the end of the information seeking process. It was against these mental templates that the policy and researchers

workers judged they had enough information. The purpose was specified by the mental templates they held of the task and the judgement of enough information was a question of whether or not the information 'meets the needs' (Ron, IV33, L448-9) captured in that mental templates which acted as gauges against which judgements of enough information were made. The role of the mental templates in the policy and research workers' judgements of enough information revealed that the judgements of enough information were inextricably linked to the critical incident tasks that initiated the policy and research workers' information seeking and use.

A graphical representation of the mental template of the task and the information needed is depicted in *Figure 6.1*, using the terms used by the policy and research workers in the interviews.

Figure 6.1 Components of the mental template



Note. Components as identified by the policy and research workers.

6.1.2 Iterative process of judging enough information

Many policy and research workers reported making ongoing judgements of enough information throughout the information seeking that contributed to the completion of the task. Often, they needed to determine if they had enough information to move to the next step. At the outset, for example, Alison found herself needing 'enough information to make a start, to find a starting point for what I would do' (Alison, IV12, L40-1). As Ron continued to work on the data model, he was looking for the information needed to 'drive the next, next iteration of the process' (Ron, IV33, L449-50). This ongoing and repeated judgement of enough information was driven by three factors:

- changes in the political environment of the policy and researcher workers
- gaps and omissions revealed in writing up work products
- feedback from colleagues and supervisors.

Firstly several policy and research workers reported that the context in which they were operating changed throughout the process. Politicians, stakeholders or supervisors changed their views about the nature of the issue or about what needed to be covered. For example, John was preparing a briefing paper on the impact of a new trade agreement during the period when the agreement was being brokered. He found that he needed to keep monitoring what was happening at the political level in order to be sure he was still adequately addressing the issues that were politically significant in his jurisdiction.

> the negotiations, that kept occurring every week before the brief was due […] so you're basically getting the latest information […] it is always iterative and new things may come in and that may affect your view, brief or how you offer conclusions (John, IV6, L480-4)

As the dimensions of John's critical incident task changed, so did the mental template he was using and in turn his information needs also changed. As a consequence, what constituted enough information to meet those needs changed.

A second factor for policy and research workers reassessing if they had enough information was the act of writing up their work products. Some of them used the writing as a tactic to reveal where there were gaps in their information, and several

reported finding it difficult to judge if they had enough until they started that writing. Nancy at one point had decided she had enough information. However, as she began to write, she found 'as you work through, you realise, "'actually, I don't understand what I'm talking about here''' (Nancy, IV12, L405-6), a judgement that sent her off looking for more information to help her make better sense of the issue, 'to do some analyses, or get some more papers' (Nancy, IV12, L425) . Nancy was aware herself of the iterative nature of the process: 'it's an iterative process' (Nancy, IV12, L409).

The third factor for reassessing the information to hand was the feedback received in both a formal and an informal fashion. The feedback highlighted where there were gaps in the mental template or if there was insufficient information. The role and nature of feedback in the process of judging enough information is discussed in detail in *Section 6.1.4: Collaborative process of judging enough information.*

The regular reassessment of enough information continued right up to, and in some cases, beyond the completion of the task. Paul reported he did not know if he had enough information until his paper was 'signed off and it's gone and you can't change it […] you keep gathering information and it's iterative' (Paul, IV6, L472-4). And even after the task had been completed and the written product signed off, submitted or published, policy and research workers reported continuing to monitor the issues they had written about. Quentin, for instance, at the time of the interviews was still keeping an eye on the problem he had tried to resolve, in case 'new evidence' (Quentin IV15, L261) had appeared, additional information that would have vindicated his position or provided further clues about the cause of the problem.

6.1.3 Fluid nature of the judgements of enough information

Inextricably linked with the iterative process of judging enough information was the fluidity of what constituted enough information. The volatility of their working environments coupled with their habitual collaboration and systematic seeking of regular feedback created highly fluid situations for the policy and research workers. This fluidity flowed through to and affected both the mental templates of the critical incident tasks and the judgements of enough information made against those templates.

The fluidity of enough information arose from the changing context and feedback received. In response to feedback the policy and research workers made iterative assessments and reassessments of what information was needed to complete the tasks resulting in updated mental templates of the tasks and the information needed. For example, Paul concluded 'your actual information needs have evolved throughout that whole process' (Paul, IV6, L474). Kate commented that though she had at the outset felt both the task and the information gathering would be straightforward, the process of seeking and using the information 'got a lot muddier before it got clearer again' (Kate, IV21, L173-4). Alison was also aware she could change the mental template she was working with:

> maybe you're asking me what … what's enough information … to meet the target you've already decided on. Even so, you can still, you can always reshape that, you can always shape that target (Alison, IV12, L454-6)

The mental templates used by the policy and research workers in their judgements of enough information changed for two main reasons. Firstly, the political context in some cases forced a change of perspective or even a completely different direction. So Ron found that 'what was the purpose [of the data model] kept changing' (Ron, IV33, L504-5) and further, that two extra requirements to be included 'came along later in the process' (Ron, IV33, L457) and had to be incorporated. The task Ron was undertaking was also affected by external influences:

> [Because] of the political opportunity with the Minister resigning, the Premier resigning um and the stakeholders decided, well, this – yeah, new minister, new government, or new premier, whatever. Let's try and re-negotiate this, so the, the purpose changed a bit there, and they tried to squeeze a bit more so, we've had to shift some of the data sets to, to, to match that change in purpose (Ron, IV33, L512-20)

An issue raised in the media which had not been covered in her submission meant that for VF, 'it was going back to make sure that we'd covered that' (Vita, IV13, L404-5).

Secondly, feedback from colleagues and supervisors identified gaps in coverage or a paucity of information around a certain point. For example, after sending a draft out for

comment, Cath found colleagues had suggested new things, so 'I'd have to go and gather a bit more about that' (Cath, IV15, L283-4).

Alison, when asked about how she made the judgement that she had enough information responded with the question:

> enough for what? and the what is a moveable line, I reckon, because … if you've got this much information, then you can do this with it. If you've got this much information, then you can do this with it (Alison, IV12, L450-3)

Monitoring their changing environments and seeking feedback helped policy and research workers in their judgements of enough information. However, the fluid and evolving nature of the process of making these judgements meant that, for many policy and research workers, it was not possible to know in any objective way that they had enough information. For instance, Carol argued that the concept of enough information was 'meaningless to [her]' (Carol, IV9, L373) in the sense that it was like a piece of string, and could be any length she needed it to be. That meant 'there isn't any objective point where – that you can tick off and say, this is enough' (Carol, IV9, L393-4). Alison's views supported this, as she explained:

> I don't think you ever know … if you've got it all, because it's a fluid thing, like we said, a different opinion or a different slant on something can come out the next day (Alison, IV9, L325-7)

6.1.4 Collaborative process of judging of enough information

The policy and research workers did not make their assessments of enough information alone. All of them collaborated both informally and formally throughout the process of task completion, and in the process of judging if they had enough information. This collaboration occurred irrespective of whether the task had been assigned to an individual or to a team.

In most cases in the study, the critical incident tasks had been assigned to individual policy and research workers (13 out of 21). In other cases (5), the critical incident tasks were part of larger tasks. The policy and research workers took responsibility for the

critical incident tasks with other staff with members taking responsibility for other tasks within that larger task. The remaining three policy and research workers worked in specially created formal teams brought together to complete the tasks. However, no matter how task responsibility was assigned, collaboration in developing the mental template and in assessing enough information were hallmarks of the experiences reported by all of the policy and research workers participating in the study.

Collaborative efforts were directed initially towards developing an understanding of what the task required. These efforts took the form of brainstorming ideas or seeking feedback on the metal template of the task as it was developed. Collaboration in determining enough information to meet those task requirements was apparent in the feedback sought regularly on whether the information gathered was fit for purpose.

Collaborating on mental templates

Because of the loosely structured nature of the critical incident tasks policy and research workers often found themselves working with colleagues and supervisors to develop an understanding of what was required of them. The uncertainties that confronted them as they attempted to understand the task requirements were resolved through a process of seeking ideas and feedback from colleagues and supervisors. Working sometimes in subject areas where they had little domain knowledge, participants drew on the experience and knowledge of their colleagues and supervisors to help them understand what they were being asked to do and how to get started on their tasks. These collaborations sometimes took the form of brainstorming with colleagues to develop an initial mental template for the task while in other instances, policy and research workers drew on the experience of colleagues in a more informal manner. For example, Vita's initial reaction was 'I can't do this by myself' (Vita, IV21, L245), as she was 'grabbing anyone around' (Vita, IV21, L246) to use as a sounding board.

In some cases, the policy and research workers worked on the critical incident tasks in teams, a situation that required them to work collaboratively on developing the mental templates. Sometimes, the collaborative formulation of the task was developed through formal mechanisms such as an expert review group or through formal consultation processes with stakeholders. Several organisations had established expert reference

groups, created purposefully to act as sounding boards for staff. For several tasks formal consultation with stakeholders was a requirement, a common practice in the public sector. For example, the regulatory review in which Paul's discussion paper was embedded followed an established process. An important element of the regulatory review process was the stakeholder consultation at the commencement of the review. However, even when the policy and research workers had been asked to complete the task alone, they collaborated with colleagues in establishing the mental template of the task.

Collaborating on judgements of enough information

The policy and research workers collaborated extensively during the process of judging enough information. Whether or not the mental template had been developed collaboratively, feedback from colleagues and supervisors was sought as the policy and research workers made iterative judgements of enough information. The feedback was sought from three different groups of people in the study:

- colleagues who were asked to read draft work documents and confirm there were no gaps in coverage, a cue to the policy and research workers that they had gathered enough information
- supervisors who formally signed off documents, indicating that there was enough information
- stakeholders and reference groups whose responses to work products were anticipated by the policy and research workers.

Several policy and research workers relied on colleagues to review their written products and advise if there were gaps in them. These gaps could be in the arguments being put, in the subject or topic coverage of the product or in the information provided to support the arguments. Cath used colleagues to provide feedback on the coverage of the policy she was preparing and to identify the gaps:

> we had a couple of other people in the unit so I asked these people to comment you know, give them a draft and get them to comment on that, and yeah, so getting feedback that way (Cath, IV13, L640-2).

After that feedback had been received, Cath found: ‘I’d have to go and gather a bit more information’ (Cath, IV15, L283-4). Kate was another of several policy and research workers who reported using this approach regularly:

> giving it to somebody else to read, and I mean they may or may not be sort of experts in the field but often, you know you hope that they are, and if there is some big gap, that you’ve left out, that someone else is going to point you, you know, in the right direction and say look, you need to sort of include something in this area that you haven’t (Kate, IV21, Ls 456-460).

Towards the end of the critical incident task, when information had been gathered and initial drafts prepared, participants often used supervisors and formal reference groups as feedback mechanisms. In some instances the policy and research workers relied on senior people to identify any gaps in their own judgement of enough information. At times the policy and research workers sent drafts to their supervisors as a way of highlighting gaps, and ‘if they change it, that’s good in a way because they’ve engaged with it and you know you’re getting an idea for next time’ (Alan, IV3, L337-8).

Several policy and research workers explained that they never really knew if they had enough information until someone else told them so officially. Paul felt he didn’t know if he had enough until it was ‘signed off and it’s gone and you can’t change it’ (Paul, IV6, L472). Fiona concluded that ‘enough is when we’ve sort of got a brief done and someone’s signed it’ (Fiona, IV27, L175-6). One policy and research worker who was new to the public sector commented on the bureaucratic process of sending a draft up the line for comment by senior staff, having to revise it and sending it up again for signoff. She saw this process as a public sector tactic ‘that helps to define the, kind of, purpose and scope of, of some of the projects’ (Barbara, IV18, L580-1).

Fiona relied on external stakeholders as well to provide this sort of feedback. Fiona reported that once she had a response from stakeholders on the draft briefing, when they said ‘“yes, that’s clear, that’s our understanding too” –that for us was sufficient. We’d done enough’ (Fiona, IV27, L9-10).

Sometimes this feedback was gauged indirectly. As participants worked on gathering information and working it into a draft document, they started to think about how other people would perceive and understand their work. For Paul, working on a review of regulation, this was an important part of assessing if he had enough information:

> I guess you start to anticipate how it's going to be received, in this case, industry is the main stakeholder who it's going to effect. Um … so you've decided what you want to go out with and then you start to think about how they're going to react to it, whether it's going to be received favourably, which is almost not going to be the case, no matter what you do [laughing] um … or whether it's fair, you know, whether, you know, whether you can argue the case strongly enough to say well, ok you mightn't like it but we're doing it because of this, this and this, we need to address these problems (Paul, IV6, L456-63)

Giving drafts of the written work product to someone else to read helped the policy and research workers to "know that actually that's sufficient' (Kate, IV21, L457).

Sometimes the feedback received was that there was not enough information, that there were gaps in the argument being put or in coverage of key points. Feedback of this nature sent the policy and research workers back to do more information gathering. For example, Ryan received feedback from his newly arrived Director that he needed to pursue another aspect which had not been covered in the initial literature review:

> the Director […] he suggested another possible […] not only just another possible thing to read, but also, there was an area where, which was a little bit underdeveloped about the gaps in the literature (Ryan, IV18, L295-8).

The importance of feedback in the assessment of enough information was highlighted by a comment from one policy and research worker who was new to his department. Robert was working alone on a discussion paper task he had set himself, but was aware of the lack of access to feedback from colleagues or supervisors : 'It would have been nice to have someone around to make … you know, help me make that decision' (Robert, IV32, L480-1) about enough information.

This analysis of how policy and research workers judged they had enough information closes with a rich contextualised description of how one policy and research worker

assessed and reassessed her judgements of enough information as she carried out her task and the associated information seeking. This description in *Figure 6.2* augments the interpretive report of the study findings by portraying the context in which Vita sought and used information and the nuances experienced by Vita during her information seeking and judgements of enough information.

Figure 6.2 Vita's assessment and reassessment of enough information

Vita's critical incident task was to prepare a submission in response to another public sector department's decisions about young drivers. Among other responsibilities, this department regulated traffic rules for the state. The department had announced it was reviewing guidelines for young drivers and planned to bring in reforms aiming to improve safety for this group. Vita and her colleagues could see the proposed changes would be detrimental to the wellbeing of young people and decided to prepare a response.

At the outset, there was confusion about exactly what Vita's organisation was supposed to be doing. Vita's team was unsure whether they should respond immediately to the department's announcement or wait to see if a discussion paper was released. The department then announced changes to the review process, indicating the process would commence with a consultation period. As part of this consultation process, the department released a discussion paper and Vita was given the task of preparing the organisation's formal response to the discussion paper. However until the department released the discussion paper, Vita was unable to start work on gathering information since she was unsure exactly what issues she would need to address in her response. This situation was a source of uncertainty and frustration. Further, because she knew little about road safety issues and her initial searches had found a substantial body of literature, Vita felt overwhelmed by the task she had been assigned.

Vita initially sought out the Young People's Reference Group, a standing group used by her organisation to provide guidance. She set up and facilitated focus groups with representatives of the age groups suggested by the Reference Group and, at the same time, commissioned the organisation's information manager to carry out database searches around topics and search terms she provided. Vita carried out her own desk research, sourcing and reviewing the references in the discussion paper released by the Department and using the web to source policy material from overseas and interstate jurisdictions. Vita was overwhelmed by the amount of information available, so for her, one challenge was making something useful out of it: 'how do I make that into anything that could possibly be a real policy?' (IV21, L552/3). Vita worked her way through the material and brought it under control by using as reference points the viewpoints of the young people interviewed. Once she had a clearer idea of what she was after, the gathering of the information was straightforward.

Although Vita was the only person working directly on the submission, she worked collaboratively, relying on advice from colleagues and supervisors, 'grabbing anyone around' to use as a sounding board (IV21, L246). She relied on both colleagues and the Reference Group members to give her different points of view, which she found 'just kind of help you to clarify in your mind' (IV21, L254) which issues needed priority and which were less significant.

The shifting and ill-defined goals towards which Vita worked were typified in a dilemma she had faced several times in the past. The literature and research findings would flag an issue as important or indicate that a solution worked. However, when Vita interviewed young people, she found they didn't see the topic as an issue or the solution as workable. Then she has to go back to 'to fill in those gaps' (IV21, L301), talking again to the Young People's Reference Group, to the research participants or even commissioning a new group of participants. In this case, Vita found it especially difficult to deal with the dilemma. The young interviewees advised they did not want a certain proposal to be brought in by the Government. However, Vita knew from research findings that this response was effective in reducing death and injury in road accidents, and found herself thinking 'which way do you go?' (IV19, L413). This dilemma necessitated 'a trip back' (IV21, L322) to seek more input from young people, and in the end, she included both the research and the young people's views on the issue.

Vita did not really know if she had enough information until she started writing up the submission. This was a common experience for her, when a lack of flow in the written report can suggest that something is missing. At this stage, for a second time, Vita drew on her colleagues to give her feedback about whether or not she had missed something crucial. Vita found the timeframes within which she had to work caused her stress. In the case of guidelines for young drivers, she found herself getting close to the deadline but still 'going back and forth with changes a lot' (IV21, L401). Adding to the stress in this

instance, a new issue surfaced in the media when Vita had almost finished the submission. It was an issue 'we hadn't really talked about' (IV21, L403/4), so she had to go back and make sure she covered this new concern.

Vita she was aware that this submission responding to proposed changes to guidelines for young drivers had the potential to save lives. Vita felt 'torn' (IV19, L407) when she looked at newspaper reports about 'some young person who had died' (IV19, L409), knowing that had some recommended changes already been in place, for example, a curfew on young drivers, then that death might not have occurred. Vita was relieved to get the submission written and off her desk and felt pleased that '… it's actually coming together. I never though it would' (IV 21, L360/1).

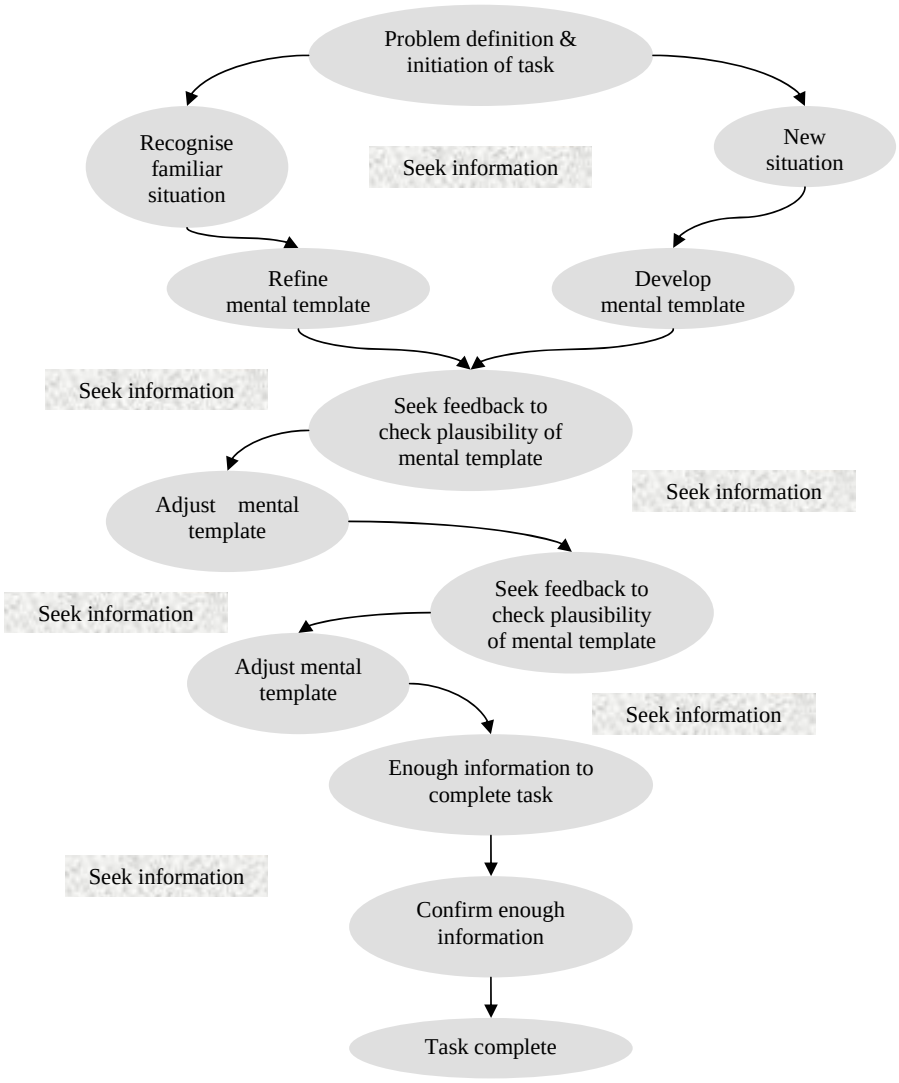
Note. Vignette from case 13.

In summary the policy and research workers judged they had enough information against mental templates they had formed of the tasks. An essential first step was scoping or judging the nature of the work task ahead of them. This scoping helped them develop the mental templates which they felt were necessary both for getting started on the tasks themselves and as guides to the information needed.

The development of these mental templates involved collaboration and feedback from colleagues, supervisors and stakeholders. The policy and research workers experienced judgements of enough information as an iterative process during which feedback brought about changes in their understandings of the purposes of their critical incident tasks as well as closely the information they had gathered matched what was required. The feedback from colleagues, supervisors, and stakeholders shaped their judgements of whether or not they had gathered enough information.

The mental templates of task and information needed were fluid and changed over time as feedback from supervisors or colleagues was received and incorporated in a process of continuing judgement and updating of their understandings of what was required of the tasks. As the templates changed, so too did their assessments of what constituted enough information. Their judgements of enough information were carried out by answering the question: Enough for what? with *what* being delineated by the mental templates they had developed and modified. This iterative process saw the policy and research workers to match the information they had gathered against the mental templates of what they needed to complete the tasks. As the policy and research workers regularly updated their understandings of what was required, several influences shaped their judgements of enough information. This process is captured graphically in *Figure 6.3*.

Figure 6.3 The process of judging enough information



Note. The mental template comprises both task requirements and information needed

6.2 Influences on judgements of enough information

This section presents the findings on the second research question: What influences shape workers' assessments of enough information? How do these influences shape

assessments of enough information? This research question focused attention on the signals and cues that indicated to the policy and research workers that they had enough information, and the influences both individual and contextual that affected their judgements of enough information as they gathered and used information to prepare their work products.

The process of judging enough information is revisited to examine the influences on the judgements made by the policy and research workers, and to report on the ways in which those influences shaped the judgements. The research interest lies in influences on the judgements of enough information rather than on influences on the policy and research workers themselves or on their information seeking activities.

The findings on this research question are presented against the framework of the information use environment (Taylor, 1991) of the policy and research workers. Only some of the elements of the policy and research workers' IUE, described in Chapter 5, were revealed as influences on their judgements of enough information as they moved through the fluid and iterative process of making that assessment. Findings on the factors that influenced the policy and research workers' judgements of enough information are presented in the following sections:

1. People
    - people other than the policy and research workers
    - the policy and research workers
2. Problems
3. Settings – organisational style and structure
    - time constraints
    - organisational style for work products
    - organisational approach to risk and uncertainty
4. Decision making processes

Beyond these elements of the information use environment identified in the original model, one other major influence on the judgements of enough information was the

critical incident task itself. The ways in which tasks mediated the judgements of enough information were presented in detail in *Section 6.1: Judging enough information*.

6.2.1 People

The following discussion on the role of people in influencing judgements of enough information is handled in two sections: people other than the policy and research workers whose views were influential, and the policy and research workers themselves.

People other than the policy and research workers

The perspectives and opinions of three groups of people in different roles influenced the judgements of enough information in different ways. These three groups:

- clients and stakeholders
- the policy and research workers' colleagues
- the policy and research workers' supervisors and senior staff in their organisation.

The views of clients and stakeholders contributed to the shaping of the scoping and definition of the problems themselves which in turn influenced the mental templates of the tasks and information needed. Paul for example, described how his task had commenced:

> with this Regulation, we did really extensive consultation so before we even started with the proposal, we went out and did workshops and talked to industry and the community and environment groups and just to put some ideas out there and get some ideas and we synthesised all that into an options paper, um and put that out for consultation … and then we sat down at the end of that and developed actually the regulatory proposal (Paul, IV4, L78-83).

As well as indirectly shaping the mental templates in the early stages of the tasks, the views of clients and stakeholders were also influential in the closing stages. As work on the task neared its end, the policy and research workers began to anticipate how clients and stakeholders would receive the proposals captured in their papers and reports. As he worked towards a resolution of the problem of controls to limit air pollution, Paul was

conscious that ‘there’s just a whole range of views you’re going to come up against and I guess, trying to see how your proposal is going to be received by those people’ (Paul, IV6, L570-1).

The advice and counsel of colleagues was also an important influence on the policy and research workers’ judgements of enough information. This influence was evident in three different ways.

Firstly colleagues provided information that helped the policy and research workers understand the positions’ of clients and stakeholders. In this way, they contributed to the fashioning of the mental templates needed for the tasks and so, indirectly influenced the judgements of enough information. Secondly colleagues influenced the judgements of enough information in a more direct way. It was colleagues to whom the policy and research workers most often turned when they needed feedback on their draft work products. Cath followed an established internal consultation process as she

> sent it out to all the regions and um ...the different branches and got back queries and things like that so, that could give us a bit of an idea as to what wasn’t clear or what needed to have, yeah what needed to have more information in it (Cath, IV15, L 420-3).

For Clare, reaching this step in the process had a calming effect:

> the panic starts to subside a bit, because you think – you get it out to the people you need to get comments from and you check that they’ve got the email or that they’re that they can do it and then you tell them the urgency and they always know that that’s going to be the case so your panic subsides and then, then I start to put the brief together (Clare, IV3, L295-9)

Thirdly towards the end of the critical incident tasks colleagues again provided feedback on how well the work of the policy and research workers had met its purpose. Quentin described how he completed his draft and then he would

> give to [a colleague] or other senior managers to have a look, they won’t come back with crucial, critical questions ...about statement you make. They say ‘oh, maybe change a bit, but the fundamentals are there’, then, you know, it’s there (Quentin, IV15, L406-9)

The third group of people whose views influenced the policy and research workers' judgements of enough information were their supervisors and senior staff in their organisations. The policy and research workers sometimes drew on the experience and knowledge of their supervisors to provide feedback on their draft work products, in similar fashion to the way they sought feedback from their colleagues. For example Ryan reflected that the quality of his research report, on success factors for improving educational outcomes for indigenous Australians, had suffered because his supervisor was

> very, very busy, at the time, and probably wasn't able to uh, to give it very much attention […] probably it could've benefited by uh, him, if he was able to take a very, very careful look at it. Um […] in the sense of a second pair of eyes […] Because of that balance. I mean, where I go off on my enthusiasm, uh, he'll bring me back down to the earth. […] And so probably uh, it could've benefited by, by his more cautious eye passing over, over some of it and um, you know, sort of identifying some of my more um, perhaps less well-founded enthusiasms (Ryan, IV16, L591-610).

Supervisors and senior managers also played a role in the judgements of enough information through their responsibility for signing off on the task as approved. This action was a final indication that the task had been completed satisfactorily and that, de facto, enough information had been gathered and used. This was often a stressful time for the policy and research workers. Vita observed:

> I guess with the submission or whatever, it's not just written and then sent straight away and then that's it. You know it has to go through um, a few other people before it even gets out there. And so, that can sometimes be a stressful time as well. You kind of feel relief, you go 'oh I've finished this!' but then it's gotta go through um different people and um yeah that can be quite stressful (Vita, IV 21, L391-5).

Sometimes supervisors or senior managers gave a clear signal of their acceptance or non-acceptance of the work, in the form of a comment on the submitted document which then went back to the policy and research worker. At other times, however, no comment was made on the discussion paper, the policy, or the research report and it seemed to just disappear. This was the experience of Cath, who sent her evaluation policy up the line to senior staff 'and it's been sitting there for months and months, I've

been trying to get feedback' (Cath, IV13, L313-5). This experience emphasised the point made earlier in this section that the policy and research workers often never really knew if they had gathered enough information. *Figure 6.4* contains a vignette depicting how the views of her supervisor and of stakeholders played a role in Fiona's judgement of enough information.

Figure 6.4 The influence of supervisor and stakeholders

Fiona's critical incident task was the preparation of a discussion paper. The discussion paper was one part of a project to develop and present a piece of new legislation. When working in areas in which she had some experience, Fiona usually felt that she had an *"inkling"* (IV 27, L329), some *"broader schemata"* within which to begin work. In this case, however, Fiona felt she had started with *"blank sheets"* (IV 27, L111/2).

Fiona started her information seeking by doing a broad scan – finding *"all sorts of bits and pieces that had to be sort of put together"* (IV 27, L 39-40). In doing this early information seeking, Fiona's manager helped her by giving her perspectives on the task and by explaining task requirements. But Fiona still felt at the beginning: *"which bit of string do you start with?"* (IV 26, no lines).

As she began to unravel the ball of string, Fiona began to see her way forward. Fiona was dealing with a variety of stakeholders with different concerns – and would head off in one direction, only to find after she had got the briefing paper done, that no, that wasn't going to work. She found herself working in a context in which *"events were moving so fast that things kept overtaking things"* (IV27B, L62/3) and was *"working so fast and the goalposts were moving at such a rapid rate"* (IV 27, L132/3).

As she worked through the information gathering and putting together the paper, there was a lot of *"refining"* and *"sharpening"*, and reaching the conclusion that yes, *"that meets the issue, that gives us an answer we can use"* (IV 27B, L 29/30). As she worked through the task and the information gathering, Fiona felt they were *"layering, were building up this understanding"* (IV 26, no lines). She experienced the information gathering as *"that constant backward and forwarding"* (IV 26, no lines).

Fiona had to look at the issues form the perspectives of all the different stakeholders and anticipate how they would react, and aim to manage that reaction and there was a lot of working backwards and working with other organisations: *'The policy issues I suppose were really, we ultimately needed the Minister's or the Premier's approval and central agencies […]and with that, that sorted it'* (IV27, L18-20)

Fiona felt she was aiming for something *"workmanlike"* which would *"address the issues […] have an argument that works* […] *that's the main thing"* (IV 27, L 343/4).
Other agencies also played a role in helping assess when Fiona had enough information. When associates in the other organisations provided feedback, advising *"yep, yep, yep, that'll work"* (IV 27, L 188), Fiona's confidence that she had what was needed increased.

Note. Vignette from case 18.

For those tasks associated with projects that had a firm external deadline, such as new legislation, the policy and research workers at least knew that the project in its current iteration was completed. However, without a final form of feedback, many of the policy and research workers could not be sure that the completed work products had been fit for their purposes and the information they had gathered enough. Robert commented on this experience more generally:

> if the document is something which needs to – is fairly straightforward like a, like the ordinary brief, yes. You get it back, with comments, send

> it off, no worries. But if it's more complicated than that. And is, and there's um, specific recommendations, yeah, it can disappear for ages. And you just don't get enough feedback on the decision making processes up the line. So they might ignore something completely and you don't know why. Or, they might uh, change what you're trying to present, you're not really sure why (Robert, IV28, L194-200).

These organisational decision making processes themselves are examined in more detail in *Section 6.2.4: Decision making processes*.

Policy and research workers

The policy and research workers drew on their own individual experiences as an aid in judging when and if they had enough information. The experience was related not only to domain knowledge but also to their individual professional experience in the organisational contexts in which they operated.

The policy and research workers did not appear to use their experiences in rational or objective ways. Rather, they spoke of using their intuition. Tim acknowledged the judgement was 'not scientific at all' (Tim, IV24, L430). The policy and research workers relied on making an 'educated guess' (Gabi, IV31, L349) or on their own 'reading of the tea leaves' (Tim, IV24, L336-7). The judgement calls made by the policy and research workers that they had enough information, were based on feelings of confidence that they had created a written product which was fit for purpose. Policy and research workers also felt they needed to be confident that they had enough information to support the arguments they were making in their papers. Several policy and research workers reported they reviewed the close-to-final product, 'trying to see how your proposal is going to be received by those people' (Paul, IV6, L570) and ensuring that they had 'covered the, the bases of whatever [the] main propositions are, and you've got supporting evidence either in argument form or empirical evidence, that has to be it' (Carol, IV9, L345-7). This review of enough information against the mental template appears almost as a kind of internal feedback loop, a counter point to the external feedback they sought and received.

While the need to be confident they had enough information to mount a defensible position in their paper was common to most of the policy and research workers, there

was a difference in how comfortable they were about making that call. For example, Cath, who was fairly new to her organisation, confessed to intentionally gathering more information than she thought she needed because this increased her confidence that the pieces of information that she finally included in the policy she was writing 'really are necessary' (Cath, IV13, L536). Other policy and research workers, with more experience in their organisations appeared more pragmatic about possibly not having enough information, especially when working to a very tight deadline. John reported he just sent the paper up the line making sure he had documented that fact there he had been unable to make a strong recommendation because he had insufficient time to gather enough information. Several policy and research workers noted that the hierarchical and bureaucratic nature of the ways in which the public sector works meant they were able to 'defer responsibility' (Barbara, IV18, L365) about enough information to a supervisor or manager up the line. In a sense, it was seen as the supervisor's or manager's job to actually make that the final call.

The case description in *Figure 6.5* highlights Tim's use of his experience in judging that he and his team had brought together enough information.

Figure 6.5 Drawing on experience in judging enough information

Tim was a senior manager in what had been until recently a super-department. Tim had worked in the department, in its various guides, for 14 years, although had only been in his present position for three months. Tim acknowledged that 'Nothing I do ... nothing I do lives right up there in that sort of highly likely and catastrophic [risk]. Kids don't die, you know, planes don't fall out of the sky with what I do' (IV 24, L 494-496). The risks that Tim needs to manage are to with 'political fall out' (IV 24, L 497).

The critical incident task Tim discussed was part of a larger project. The project was a regulatory review, a project which follows a standard course. Within the standard process, a discussion paper is prepared and released for both stakeholder and general community comment. The critical incident task was the preparation of this discussion paper.

Having prepared this kind of discussion paper before on other topics Tim felt the process of preparing the discussion paper would be straightforward and for this reason, he devolved responsibility for the information seeking and writing up of the paper to one of his team members. Although the team member did the information gathering and the writing up, Tim had responsibility for the final decision to release the paper for public scrutiny. In making the judgement that enough information had been gathered, Tim also drew on members of an Expert Reference Group, brought together because of their knowledge and experience in the field.

Tim's 'initial sort of trawl' (IV 24, L 74) for information drew on the knowledge of departmental staff, information and advice from industry representatives and the media, the latter source used as a way of gauging community concerns. After surfacing key problems from these three sources, the team member carried out a formal literature review. Tim himself also did some literature review work, in what he described as a 'relatively mechanical' (IV 24, L201) process.

When reviewing the draft paper for the first time, Tim decided it was almost there. However, on one point, he felt there was not enough information and asked the team member to 'go away and do some more work on this' (IV 24, L 327/8). When pressed for the clues he used in making this judgement, Tim responded that he drew on a combination of his experience and his 'own reading of the tea leaves' (IV 24, L 336-7) to guide him on what was important and the breadth and depth of the coverage needed. He felt he was 'sensitive'

(IV 24, L 339) to what might cause problems – he used his 'radar' (IV 24, L 340), explicitly acknowledging that this approach was not 'scientific at all' (IV 24, L 340).

Towards the end of work on the task, Tim felt it would be 'fairly smooth sailing' (IV 24, L 238) as he and the team member had covered the key points. Several points had 'some controversy around them' (IV 24, L 240) but Tim was confident that he could manage those potential controversies because he had the arguments in place to support his position.

The lack of a scientific approach was also reflected in TG's description on recognising that enough information had been gathered and used in the discussion paper: 'We knew it when ... we knew it more by gut than by, you know, having exhausted [sources]' (IV 24, L 320/1). However, before the paper went out to the public, Tim ran it past the Expert Reference Group 'to sort of check again' (IV 24, L 345) that he had a solid position and that nothing was missing, a kind of 'litmus test' (IV24, L347) for the judgement of enough information.

TG also acknowledged the importance of timing as much as having a solid argument based on solid information. 'Timing is everything' (IV 24, L 533). 'If the timing is right and there's an intuitive perception of an problem, that is common, then you can often run off very little information and get a result. If the timing is wrong, you could have War and Peace, and it'll go nowhere. It won't matter, if the timing is wrong' (IV 24, L 541-545).

Note. Vignette from case 15.

6.2.2 The problems

A second element of the information use environment that influenced the judgements of enough information was the problems themselves, those concerns that had triggered an interest in a problem and initiated the action that found its form in the tasks assigned to the policy and research workers. This influence was apparent in the early stages of the task and information seeking, as the policy and research workers sought information that would help them understand the problem, how it was framed, why it was important, who had raised it and how it had been dealt with previously.

Information about the views of stakeholders such as the politicians helped Michael get his bearings when assigned the task of developing a public policy of forest management:

> my first task was to understand what they wanted. Um, knowing the cynical view of the majority of this government, I s'pose I was thinking 'ooh, what do they want here?' Is this a more, um, of what's occurred in the past, or um, is it a change of view? And so I had to struggle with all those concepts first of all (Michael, IV25, L231-5)

Quentin was aware of the usefulness of speaking with colleagues at the beginning of his task. This consultation helped uncover information about how the problem may have been handled previously:

> in my almost all my project, I don't think I work alone, in the sense I always go to people, talk to people, uh because many people worked here long before my time and I didn't think it's a new problem at all (Quentin, IV15, L14-7).

Sources used in clarifying the problem were sometimes diffuse as when Ryan reported that:

> the broad questions, I s'pose, were determined partly by discussions with the senior management in the uh, in the department and the uh, and sort of, the refinement through reading and um, and uh, and my experience with that, with that literature (Ryan, IV 16, L453-6).

This kind of information, the views of stakeholders, colleagues and supervisors and what was already known about the problem, either within the organisation or in the published literature, helped establish the boundaries of the mental templates themselves. This information also indicated what matters would need to be included and what matters were to be avoided, and so helped the policy and research workers shape the mental templates they needed to get started on the tasks. It was against the mental templates that the policy and research workers made their judgements of enough information.

In the scoping of the problems and the subsequent shaping of the mental templates the policy and research workers were, in a very preliminary way, beginning to determine what would eventually constitute enough information. In this way the nature and dimensions of the problems themselves shaped the critical incident tasks and subsequently the mental templates developed by the policy and research workers. As a result the problems indirectly influenced the judgements of enough information.

6.2.3 Organisational style and structure

A third element of the information use environment that influenced the judgements of enough information of the policy and research workers was style and structure of the organisations. In particular, time constraints in the form of deadlines and the organisational approach to risk and uncertainty influenced how the judgements of enough information were made.

Constrained by time

As they worked through the process of seeking information and judging they had enough the policy and research workers were conscious of working within resource constraints, in particular the constraints on their time. For many of the tasks, the policy and research workers worked to apparently tight deadlines. They often used the deadline as an end-point from which to establish a timeline for task completion. At a certain point they were committed to starting to write their work product. They weighed up the likely benefits of seeking more information against their concerns about running out of time to complete their tasks. Using this kind of cost/benefit approach and aware of the approaching deadline, they asked themselves if their efforts in getting more information were worthwhile, given the 'contribution it's making to the overall project?' (Kate, IV21, L422).

The policy and research workers reported that time constraints in the form of deadlines were very important in the decision to stop searching for more information. As well as a factor influencing information seeking, the time available to the policy and research workers for their tasks also influenced task completion and their judgements of enough information.

Short timeframes were part of the context in which the policy and research workers operated. For the critical incident tasks that were part of the context for the judgements of enough information, the deadlines were an important feature of how enough information was judged. However, although the deadline was a cue to stop seeking more information, in many cases the deadlines were moved and renegotiated as the task or the information seeking or a delay in getting feedback held up the process. Nonetheless, several policy and research workers found themselves in highly stressful situations as deadlines approached. In many cases their deadlines drove them, causing great stress. Alan observed that generally he found his work 'nerve-wracking [because] the timelines are so short now' (Alan, IV3, L221-2). Carol reported: 'I was beside myself [with anxiety]' (Carol, IV9, L264) trying to complete a submission in order to get it in on time.

A number of policy and research workers consciously and intentionally used the deadlines as triggers to move to the next phase of the work to avoid a situation in which they might 'keep collecting forever, I could still be out there searching for information and I'd have nothing' (Nancy, IV12, L432-3). Ryan used the deadline as a sign to 'tie it together as best as you possibly can' (Ryan, IV18, L322) and Michael took a similar approach, arguing 'you gotta set yourself a timeframe and work towards that timeframe and sometimes you just gotta shut the book. And start writing' (Michael, IV27, L150-1). Carol reported that she felt 'uneasy having to sort of pull the shutter down and that is in some ways, it's even presumptuous, but it has to be done' (Carol, IV9, L389-90).

The distinction between stopping the search for more information and making the judgement of enough information was a theme that showed up in the particular cases being investigated. The deadlines appeared to be less important in the judgements of enough information than in deciding to stop seeking information. The deadline was there and it had to be met, but sometimes, a less-that-complete work product was submitted, a product which the policy and research workers felt did not have enough information.

This experience was reported in a general sense: 'sometimes the briefings that we send over aren't very good but they've got to be done in the time limit' (Alan, IV3, L393-4). The briefings have gaps 'you find something a few days later and you think, "gee, it would have been nice to have known about that"' (Alan, IV3, L436-7). Ron 'hunted down as much as [he could] within […] the time [he'd] got available' (Ron, IV33, L447-8). Naomi was worried about missing some important information that could change the output of the data model she was working on: 'I miss lots of things' (Naomi, IV30, L392-3). So while the deadlines were an important factor in the process of seeking and using information and were usually the reasons the policy and research workers stopped looking for more information, their judgements of whether or not they had enough information were made independently of deadlines.

Attitudes towards risk and uncertainty

The policy and research workers in a sense were responsible for reducing the uncertainty and ambiguity of information, as they gathered raw material from a range of

sources, drew inferences and synthesised evidence before presenting it in summary form to organisational decision makers. As discussed in Chapter 5, they worked in an environment and in situations in which uncertainty was the norm and simply unavoidable.

The nature of the risk however varied and was in some cases related to the nature of the critical incident tasks. For Cath preparing an internal policy on program evaluation, the major risk was related to personal failure to successfully complete the task. Tim however was aware of the 'political fallout that sort of stuff, if we get things wrong' (Tim IV24, L497). For Tim,

> nothing I do lives right up in that sort of highly likely and catastrophic. Kids don't die, you know. Planes don't fall out of the sky with what I do. It can cost industries a lot of money if, you know if we get it, if we get it horribly wrong, horribly wrong (Tim, IV24, L491-3)

By contrast Naomi was acutely conscious of the severe impact on the clients of her organisation if she had made a wrong assumption, overlooked a critical piece of information or used data in an incorrect manner.

Several policy and research workers explicitly differentiated the experience of work-based information seeking and use from that associated with completing doctoral research. Up against a deadline but conscious she might not have enough information, Barbara felt:

> a slight feeling of ... compromise, but I'm not so invested in what I'm doing that it, it bothers me a great deal, like beyond nine to five. So with something like a PhD where it's much more personal, it's much more an expression of your own interests and your own capabilities, that, that bothered me much more 'cause I felt like I was making a compromise there. Because the stakes were greater personally. Whereas at work, it never, it never seems to have that sort of personal um, investment (Barbara, IV 18, L359-64).

These factors – a familiarity with uncertainty and the lack of personal investment in the work, together with the sense of shared responsibility flowing from the decision making processes in their organisations – all resulted in a pragmatic approach to risk and uncertainty both at the individual level and at the organisational level. The policy and

research workers were realists about managing the risks, seeing themselves engaged in producing something 'useful' (Fiona, IV27, L341) and 'workmanlike' (Fiona, IV27, L343). For the two more senior policy and research workers, those with managerial decision making responsibility, it was just one of the responsibilities of the position:

> So that's the sort of risk we were managing all the way along from the – in your context anyway – the risk of not knowing what was out there. Um. And the risk of somebody having something which we weren't, weren't aware of, the potential for that to derail the process – [managing that risk] it's fine, it's just my job (Ron, IV23, L1263-71).

This pragmatic approach to uncertainty and risk flowed through to the policy and research workers' judgements of enough information. Having done what they could to complete the task with the information they had gathered and within the timeframes available, they recognised that they had to then let the task go and accept that they might not have gathered enough information. For example, John was frustrated about not having 'sufficient information' for his briefing, but as he did not have the time to 'either dig it up or commission it or find it, or acquire it in some other form', he worked with what he had – 'it's the best you can do and you hope that's right' (John, IV6, L263-9). This experience was echoed by Gabi who was aware and indeed anxious she might have 'missed something crucial' (Gabi, IV 31, L401) but said that 'at some point you have to let go, and, go 'I've done, you know, what I can do in the time that I've [got]' (Gabi, IV31, 405-6). *Figure 6.6* depicts Gabi's pragmatic approach to judging enough information.

Figure 6.6 Pragmatic approach to the risk of not enough information

Gabi worked in the strategic policy and planning branch of a large department where she develops new policy and analyses and evaluates existing policy.

The critical incident task discussed by Gabi was the preparation of a briefing paper for an incoming Minister of the state. The paper was one part of a major project to develop and implement the Department's strategic policy on managing anti social behaviour in housing estates. Gabi described the project itself as a *'moveable feast'* (IV 31, L 312), with changes in Ministers bringing different views on what should or could be done, so changing the parameters within which they were working.

Gabi felt the signal that she had finished her information seeking was *'deadline-based'* (IV31, L 327) in that she worked back from the deadline for the final product to leave her desk, allowing time to write and revise the paper. Despite being used as a signal, Gabi noted that the deadlines were often *'artificial'* (IV 31, L451). Since the document would have to go through layers of signoff, she feels the situation is one of three weeks to get the approvals needed and two days to actually research and write the paper.

Generally, Gabi finds judging *enough information* is 'really difficult' (IV 31, L 348). She gathers information from a range of sources until *'I feel like I've got a pretty comprehensive picture'* (IV31, L 354) on a range of issues. Then she says: *'Ok, that's all I can do'* (IV 31, L 355) and she moves on to the next stage of the task.

In this instance Gabi sought to put together a balanced coverage of the issue, looking for positive and negative views, particularly mindful of her personal attitude towards the proposal being canvassed. She was conscious that there was more information she could have looked at but she decided not to pursue it. As she moved towards the deadline and completing the paper, Gabi felt relief that it was coming to an end – but she was also anxious: *'But at some point you have to let go, and go, I've done, you know, what I can do in the time'* (IV 31, L 405/6).

Gabi was conscious of the risk that she might have missed something as she determined that she had got to the end of information seeking and should start putting her paper together. She felt she had enough information when she was able to make sense of the issue and how she was representing it in the paper

*Note***.** Vignette from case 20

Several policy and research workers who prepared briefings used the standard format and size as a gauge for the amount of information they needed. Indeed, Clare reported finding herself 'calming down' (Clare, IV3, L300) as she moved into this more repetitive stage of the task, completing those sections of the brief for which she had enough information and not having to think too much about what she was doing. John, also reporting on a briefing as his critical incident task in an agency which did not have a set format, said he developed his own mental template and standard headings as a kind of mental checklist to help ensure he had enough information. Other policy and research workers used indicative word limits for research reports in a similar fashion and even when this information was not offered by supervisors, they sought from colleagues an indication of size as a guide.

6.2.4 Decision making processes

The decision making processes described by the policy and research workers were revealed in three interrelated features that were particularly relevant to the assessment of enough information. These features were:

- the use of drafts to get feedback
- the hierarchical layers of approval
- a sense of deferred and shared responsibility on the part of the policy and research workers.

The process of preparing a draft, sending it to colleagues for comment, revising it for comment, sending it to a supervisor for review and then revising it again was a formalised feedback process in most of the organisations and for a number of project

such as those associated with regulatory review. The process of seeking feedback and acting on it affected the judgements of enough information in several ways. It helped the policy and research workers initially scope the task they had been assigned and helped them formulate the mental template they would use for the task. It also helped supervisors crystallise their thinking about what was needed from the task and provided a mechanism for checking that the views of those people potentially affected by the problem resolution of which the critical incident task was a part were considered as that resolution firmed up.

Combined with the preparation of drafts and feedback processes engaged in by the policy and research workers was 'layer upon layer' (Michael, IV25, L525) of approvals. Together these features of the organisational decision making provided a way of responding to the challenges of persistent or even insoluble problems while addressing the concerns of all stakeholders and helped the policy and research workers ensure that all key points were included in their work products, that their arguments were robust and positions substantiated and that enough information had been included.

These first two features – the use of drafts and the layers of approvals – added substantial amounts of time to the decision making process. When necessary however, for example, when the timing was right, the pace of the work and the decision making could change dramatically. As Carol described the experience:

> I've always said that it has to be understood that it moves at a glacial pace and there are occasions when it goes from glacial to sort of high-speed […] there are periods where it's in our face and you can be bowled over by the speed and find yourself on back foot the whole time, or it can be glacial. What I, in my experience, haven't come across is a middle pace (Carol, IV8, L78-81)

The layers of approvals through which their work progressed also provided the policy and research workers with a sense of deferring responsibility for the judgements of enough information to their supervisors or more senior staff. Fiona recognised that she did not have ownership of the briefing she was preparing and that in the end, it 'won't be your document' (Fiona, IV 27, L498). As a policy and research worker working in a team at the lower levels of the hierarchy, Barbara felt:

> And I'm also able, able to defer responsibility in a way that well I'm not, I don't have any control over the, the deadline, or the, what's required. So, it's actually not my responsibility in the end, if, if the sort of result is a bit compromised (Barbara, IV18, L365-7).

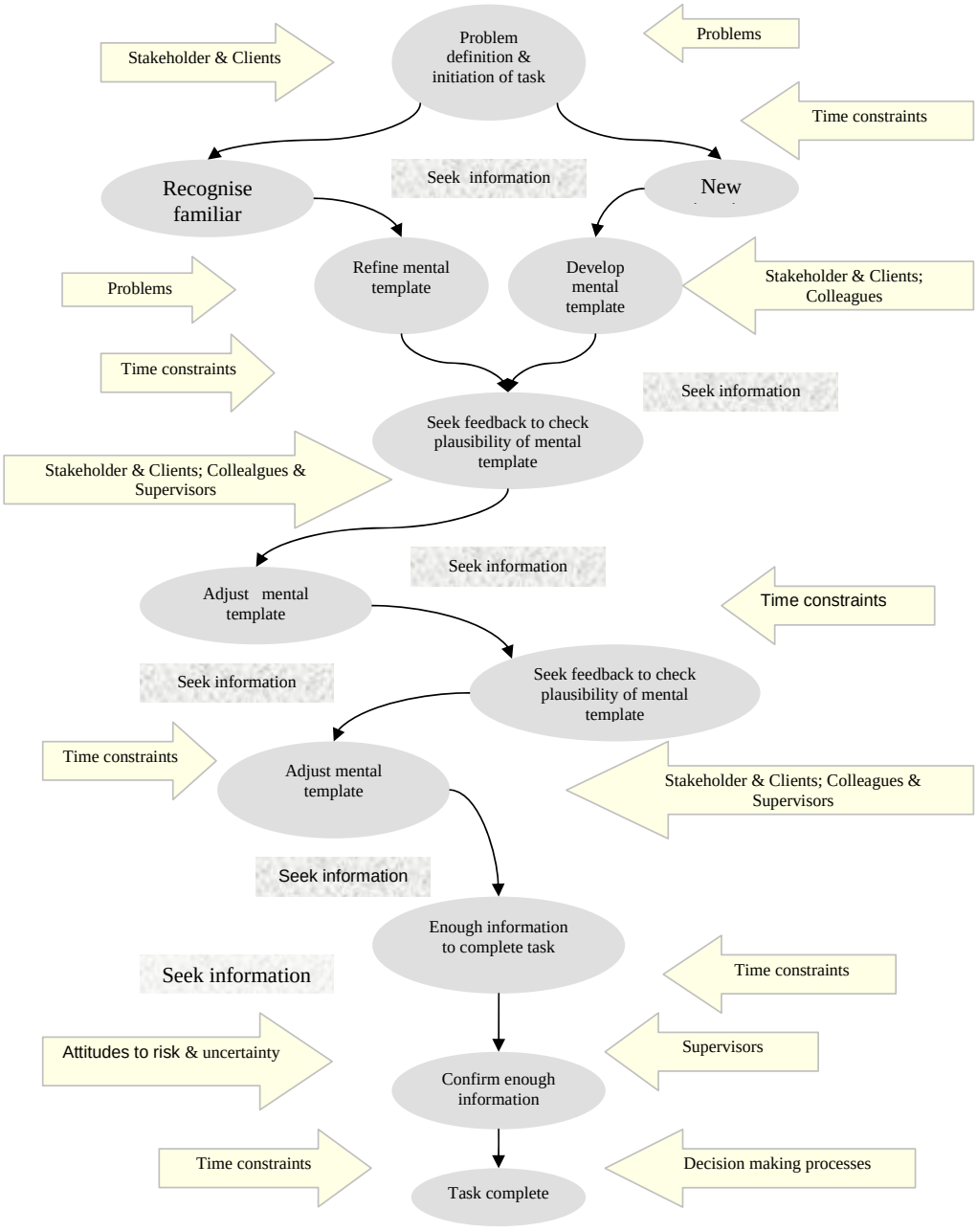
These features of the decision making processes within their organisations – the drafting, the consultation and feedback process, the layers of approvals and the shared or deferred responsibility – created a 'negotiated process' (Ryan, IV18, L676-7) of reaching resolutions of the problems that the critical incident tasks addressed. The decision making style of negotiation provided the policy and research workers with a kind of safety net, which in turn affected their individual attitudes towards risk and uncertainty as well as developing an organisational approach to the risk and uncertainty associated with seeking to resolve longstanding and intransigent societal problems.

Figure 6.7 builds on the graphical representation of the process of judging enough information that was captured in *Figure 6.2*. In *Figure 6.7*, influences on that process are added to reveal the full iterative process of judging enough information. The figure is an overview rather than a depiction of all the elements in all the critical incident tasks described by the policy and research workers.

These elements influenced the judgements of enough information both directly and indirectly. Direct influences on the judgements of enough information were also apparent. During the end stages of the tasks, the decision processes in the organisations and the approaches to risk and uncertainty influenced the judgements of enough information. For example, Tim, as an experienced senior manager was aware of the risks he faced when deciding that the discussion paper was ready to be released to the public:

> Getting a discussion paper ... which ... starts to imply a government position and it, and it will, just by the nature of the way it is written, um, starts to take you into riskier territory and putting that out into the public arena, getting the approval to do so, and all the rest of it, requires you to then think about: what are those risks, and how are you, how are you managing those risks (Tim, IV24, L147-152).

Figure 6.7 Overview of influences on judgements of enough information



Note. Figure builds on *Figure 6.2* to show influences on judgements of enough information.

So, before Tim made the paper public, he

> 'pushed it out to those [expert] reference groups to, to sort of check again. And there was a lot of knowledge and experience um, on the, about the industry in those, in those groups. And that, that was our, that was our litmus test, so once I was satisfied, it was the case of leaving it there' (Tim, IV24, L345-8).

Indirect influences were apparent in the ways in which the mental template of the task was developed. For instance, it was important for John to understand the background to the problems on which he prepared briefings:

> essentially the first step is trying to determine what are the, what's the current status. Um … the agenda item was a starting point, and to try and understand why those agenda items were raised to be discussed. In which case to work out where we are in the process on certain items, um … why as a particular jurisdiction's raised this problem, what are their concerns and as well as identifying the other concerns, that … we might actually want to raise ourselves. Um … so the first starting point is to say well, what's working and what's not working at the moment in this area and from there you sort of say, well, who do we consult to try and work this out, given that I'm not actually from that background (John, IV6, L80-8)

Another example of this kind of indirect influence was the way in which the policy and research workers took into account the views of clients and stakeholders on both the nature of the problems and the options for resolving them. Right at the outset, it was apparent that some options were outside the boundaries, as Tim observed:

> there are, there are options, once you've got this information […]. Then, there are options that will be clearly unacceptable from a public policy, from a financial, […] or other reasons, then you do not include those options in discussion papers, or in options papers, because they, they will create expectations that are going to be completely unrealistic or whatever else. […] There are other options that are clearly easily in an options mix, regardless but there's always the shades of grey (Tim, IV24, L201-5)

In this section the influences on the policy and research workers judgements of enough information were analysed in more detail and the manner of their influencing of the judgements of enough information examined. In summary, the elements of the information use environment that influenced the policy and research workers' judgements of enough information were:

- people, both other people and the policy and research workers themselves

- the problems of which the critical incident tasks were a part
- aspects of the setting in the form of organisational style and structure: time constraints, organisational attitudes towards risk and uncertainty, acceptable style and format of work products
- decision making processes.

Chapter Conclusion

In this chapter the findings on the two research questions that defined the study have been presented.

The first research question was: *What do workers understand to be enough information? How do they determine that they have enough information to complete work tasks?* The findings on this question revealed that the policy and research workers in the study experienced the judgement of enough information as an iterative and collaborative process of matching the information gathered against mental templates of the critical incident tasks.

For the policy and research workers judging enough information appeared to have as much to with the critical incident tasks in which their information seeking was embedded as with information itself. The critical first step was the development of mental templates. The mental templates comprised both task-related attributes such as the scope and boundaries of the critical incident tasks and information-related attributes such as which matters were to be included in the work products that were the physical output of completing the tasks. Once the mental templates had been developed, the policy and research workers gathered information to address that matters that needed to be covered.

The findings have shown that the judgements of enough information made by the policy and research workers were experienced as a process. The judgements were part of an iterative process of firstly, matching the information in hand against the mental templates developed at task assignment, and secondly, drafting the work products and then seeking feedback from a number of people on the adequacy of the drafts. The fluid nature of enough information emerged as feedback was sought and incorporated into the

mental templates. As the mental template changed and as gaps in information were identified what constituted enough information also changed.

The policy and research workers collaborated in making their judgements of enough information. The views and opinions of clients and stakeholders, colleagues, supervisors and senior staff in their organisations informed the development of the mental templates. Colleagues, supervisors and senior staff also played a role in helping the policy and research workers determine when they had gathered enough information by providing feedback on draft work products and giving final approval on the work products. As a result, the judgement of enough information became a collaborative as well as an iterative process.

The second research questions was *What influences shape workers' assessments of enough information? How do these influences shape assessments of enough information?* Findings on the second research questions revealed that a number of factors influenced judgements of enough information throughout the process. In the report on the findings, these factors were identified as elements in the information use environment of the policy and research workers.

People outside the policy and research workers' organisations – the clients and a range of different stakeholders – played a major role in perceiving there were problems that needed addressing, getting those problems onto the agenda of the organisations and also in shaping the definitions of the problems. The problems themselves in turn shaped the critical incident tasks and subsequently, the mental templates used by the policy and research workers as they worked on the tasks.

The views of colleagues, supervisors and senior staff were also influential on the judgements of enough information. The policy and research workers drew on the views of colleagues and, to a lesser extent, supervisors as they sought to understand the nature of the critical incident tasks and they developed, shaped and refined the mental templates that helped them in their information gathering and use and against which they gauged whether or not they had enough information. Colleagues and supervisors also helped determine when the completed task products were ready to go to senior

supervisors for approval. Supervisors and more senior managers gave a final sign off that indicated to the policy and research workers that they had gathered enough information for task completion.

The policy and research workers' judgements of enough information were also shaped by their experience, in particular their experience of the organisational contexts in which they were working. Their experience helped increase their confidence that the information they had gathered was enough.

The problems that had triggered the critical incident tasks being undertaken by the policy and research workers indirectly shaped their judgements of enough information by providing the initial boundaries for the tasks. The policy and research workers used information about the problems to help them develop and shape early versions of the mental templates against which they assessed enough information.

Factors to do with the organisational setting which shaped the judgements of enough information were timeframes in the form of deadlines, decision making processes and organisational approaches to risk and uncertainty. Throughout the process of judging enough information the policy and research workers were conscious of the constraint of time available for task completion although this constraint influenced the decision to stop seeking information more than the policy and research workers' judgements of enough information. The process of decision making within the organisations also shaped the judgements of enough information. Decision making in the policy and research workers' organisations involved layer upon layer of drafts, revisions, and sign offs. This process coupled with organisational attitudes towards risk and uncertainty, meant that the assessment of enough information was a negotiated and pragmatic one.

The findings reported in this chapter reveal that the judgement of enough information was experienced as an iterative process of matching information gathered against information needed for task completion. The process of making judgements of enough information was collaborative with the policy and research workers drawing on a range of people to help them develop and test their judgements of enough information. The findings illuminated the ways in which a range of interwoven factors, such as

organisational approaches to risk and uncertainty and decision making processes, influenced the policy and research workers' judgements of enough information.

In reporting empirical findings on these two research questions the thesis has added knowledge to the field of human information behaviour in context. In designing the study, in gathering, analysing and interpreting the data and in reporting the findings from the study, the researcher has demonstrated the skills exhibited by competent case study investigators (Yin, 2002, p. 59). A 'firm grasp' of the issues came from familiarity with the literatures of human information behaviour and judgement and decision making as well as experience as a policy and research worker. The open ended interview questions coupled with the researcher's effectiveness as an interviewer prompted the study participants to recall experiences and thoughts about those experiences of which they had previously been unaware. The researcher strove to challenge 'preconceived notions' arising from experience in the policy domain, continually asking herself *how do I know this?*

The researcher was 'adaptable and flexible' (Yin, 2002, p. 59) as changing circumstances required adjustments to the research design, for example, the need to carry out all interviews as quickly as possible. As well the researcher interrogated the data in the interview transcripts through three stages of analysis, the thematic analysis, the case analysis and the analysis of contextual factors in the IUE of the policy and research workers, continually challenging the sources of the evidence for emerging interpretations. Finally papers on the findings have been presented at peer-reviewed conferences and responses have been received from experienced researchers through the peer review process. The research practice summarised in this chapter conclusion strengthens the claim for the trustworthiness of the study findings. The implications of the findings are considered in Chapter 7.

Chapter 7

Discussion: Judging Enough Information

This chapter returns to those questions to consider how these findings have expanded the human information behaviour field's knowledge of the concept of enough information and the ways in which judgements of enough information are made while seeking and using information. The strengths and limitations of the study are reviewed, implications for the field of human information behaviour considered and directions put forward for future research.

7.1 How policy and research workers made judgements of enough information

The principal findings on how policy and research workers in the study determined that they had enough information were firstly that it was possible to identify the phenomenon of enough information and secondly that there were two aspects of the determination of enough information. These two aspects were:

- the development of mental templates of the critical incident work tasks
- the judgements of enough information against those mental templates.

The mental templates served as frameworks against which the policy and research workers in the study made their judgements of enough information and the policy and research workers refreshed and updated their mental templates as they worked through their tasks. This was an iterative process and as the policy and research workers updated their mental templates, the nature of what constituted enough information changed over time. The policy and research workers experienced the assessment of enough information as a process rather than a single event at the conclusion of information seeking activities.

7.1.1 Developing mental templates of tasks

The development of mental templates of the tasks and of the information needed as a first step in information seeking supports earlier research on the importance of task in shaping information seeking in the workplace. By demonstrating how the judgement of enough information is connected to the mental templates of the tasks formulated by information seekers, this finding provides additional empirical support for Vakkari's (1999, p. 830) proposition on the interrelationships between task formulation and information behaviour. The mental templates of the policy and research workers are similar to the conceptual structure of task described by Vakkari (1999, p. 829) and the task focus for information seeking that found expression in the formulation stage of the information search process model (Kuhlthau, 2004a, p. 83).

However the findings appear to counter the hypothesis of Bystrom and Hansen (2005, p. 1053) that attention to the task formulation phase is less likely in work settings because workers could be expected to be more confident in their ability to assess task requirements. In this study the policy and research workers found it was necessary to develop the mental templates.

Developing a mental template of the task also reflects the idea of bounding the search for information, identified by Foster's empirical study (2004, p. 234) in the activity of refining, during the consolidation phases of his model of information seeking behaviour. As well, the use of the templates by the policy and research workers reflected the experiences of the lawyers investigated by Kuhlthau and Tama (2001). In talking about their work tasks the lawyers used the metaphor of a puzzle and spoke of developing an idea of what information would be needed to fill in the pieces (Kuhlthau and Tama, 2001, p. 30). The role of task dimensions as a framework against which to assess enough information was reflective of findings that revealed how students used assignment questions or the expectations of teachers as a guide to help them determine they had enough information (Limberg, 1999; Parker, 2006, p. 191; Prabha, et al., 2007, p. 81).

However the need for a mental template to start the task did not appear in findings on enough information and stopping behaviour reported by Zach (2002), Agosto (2001) or

Prabha et al (2007) although Zach (2002, p. 156) did report a role for task in that enough information had to do with a feeling of comfort about the amount of information gathered to complete the task. Prabha et al (2007, p. 81) also noted amount of information as a factor but defined this as a stop rule that indicated an end of information seeking. One possible explanation for this omission is that these studies were framed within behavioural decision theory. As such they focused attention on the stop rules used in the closing stages of information seeking and so they did not consider the phenomenon of enough information as part of a process of judging enough information and deciding to stop seeking more information.

7.1.2 Judging enough: iterative and fluid

After the formulation of an initial mental template of the task and the information needed, the judgement of enough information became an iterative process for the policy and research workers. This iterative process of judging enough information supports findings from earlier workplace studies into the phenomenon. Zach's model of the factors that influenced arts administrators' decision to end their information seeking captured a feedback loop (2002, p. 158); as well, she reported explicitly (2002, p. 151) that while the administrators continued their information seeking until they decided their need was met, there was an iterative process of checking and seeking more information if necessary.

Ongoing iterations were also apparent in Kuhlthau's conclusions about the importance of understanding that the concept of enough is something that comes up 'at each stage of the search process' (Kuhlthau, 2004a, p. 199). Assessing enough information did not take the form of a decision as classically defined as a choice between two or more alternatives but as a process based on the mental templates that captured both the dimensions of the tasks and the information that was needed to complete those tasks. The mental templates comprised both the frameworks and parameters of the tasks and the key componentry and reference points that needed to be covered. As they worked, the policy and research workers used these templates as guides, assessing and re-assessing the match between the information they had and the information that was needed to meet the template requirements and through doing this, complete their tasks.

Findings from the current study on the iterative nature of the process also support those of Foster (2004, p. 232, p. 234) and Parker (2006, pp. 193-4) that the concept of knowing enough as an iterative process of questioning and recognising whether the information need has been met.

For the policy and research workers the question of *what is enough* came up throughout the process of seeking information. Findings from the current study indicated that the response to that question also changed throughout the process, as the policy and research workers continued with their tasks and sought feedback on their work products. This finding suggests that what constitutes enough information for task completion is fluid in nature. In these acts of comparing what they had with was they felt was needed the policy and research workers were exhibiting satisficing behaviour (March, 1994, p. 28).

7.1.3. Judging enough information against the mental template

Study findings revealed that, as well as being important at the beginning of information seeking, the work task was also important in helping to determine what constituted enough information throughout the information seeking process. The mental templates needed to start the task were also critical to the policy and research workers' assessments that they did indeed have enough information. This finding supports earlier studies which have identified the link between task and enough information. At a general level, Kuhlthau stated simply that the answer to the question 'what is enough' was 'enough to make sense of the information available to accomplish the task at hand' (Kuhlthau, 2004a, p. 199). The two workplace studies that explicitly sought data on the concept of enough (Kuhlthau and Tama, 2001; Zach, 2002) also recognised this relationship, with task being reported as a factor in assessing enough information.

Parallels were evident between the ways in which the policy and research workers assessed enough information against the mental templates they had fashioned and the approach of the lawyers studied by Kuhlthau and Tama (2001, p. 30). The lawyers used tasks, in their cases, the preparation of court cases, as framing devices to guide their assessment of enough information. The actions of the policy and research workers (anticipating how their work would be received, checking with colleagues and

supervisors to ensure they had not missed anything) reflected the approach of the lawyers in assessing whether they had the answers they felt were needed to counter any questions or challenges that might come up in the courtroom.

Other studies have reported similar findings on the need to have something against which to assess enough information. In the reliance on the mental template of the task and the information needed to meet the demands of the tasks, similarities were apparent with Parker's (2006, p. 189-90) conceptions of enough as control and getting done (having the 'right amount of essential elements' (2006, p. 188), and optimal production (creating a 'coherent piece of work' (p. 190). The key points to be addressed within the policy and research workers' mental templates are reflective of Limberg's (1999) conception of enough as enough material to cover the topic. Both students and academics in the study by Prabha et al (2007, p. 81) also used this sense of putting together answers to all assignment questions, although this was identified as a stop rule by Prabha et al. Similarities were also apparent in the sense of completeness that was characteristic of Parker's (2006, pp. 191-2) category of enough, enough for Completion and Satisfaction.

The policy and research workers using the mental templates as guides for their information gathering, crafted their work products until they recognised them as matching those mental templates, both for themselves and subsequently for their supervisors. The absence of a decision in the form of a choice between two or more alternatives in assessments of enough information has been observed by human information behaviour researchers in previous studies into enough information and the experiences of the policy and research workers supported these observations. Their experiences bore similarities to the ways in which the experts studied by naturalistic decision making researchers drew on their existing repertoires of solutions for potential responses to situations confronting them, testing the potential solutions through a process of mental simulation rather than evaluating and selecting from two or more options.

Missing from the experience reported by the policy and research workers was the strong creative dimension reported by the lawyers (Kuhlthau, 2004a, p. 181) and the

characteristics self-discovery and creativity found in Parker's (2006, p. 193) category of enough experienced as Generation and Creation by students. Less evident in the experiences of the policy and research workers was the sense of integrating of new information into existing knowledge structures as a signal that information seeking was at a close reported in Cole's study of a PhD student (Cole, 1997, p. 64). This is not to suggest that the knowledge structures of the policy and research workers may not have changed as they sought and used information in particular tasks. Rather there seemed to be a qualitative difference to their experiences possibly created by the different purposes of their information seeking. In the workplace, this difference meant that the more individual aspect of assessing enough information, seen in Parker's (2006, pp. 191-2) category IV of enough for 'completion and satisfaction' and in Limberg's (1999) concept of pursuing an in-depth and comprehensive understanding of an assignment topic, appeared to be less important. Indeed, several policy and research workers explicitly differentiated their workplace experience of judging enough information on this dimension of personal importance from their previous experiences of judging enough information during doctoral research.

7.1.4 Collaborative judgements of enough information

The judgements of enough information of the policy and research workers were not solely individual judgements. Throughout their information seeking and use, the policy and research workers sought feedback from colleagues and supervisors about whether or not they had enough information. They sent draft work products to colleagues for comment and they also used formal feedback mechanisms such as reference groups when close-to-final drafts were ready. For some policy and research workers the knowledge that they had enough information only came when their supervisors approved the final written products.

The study findings support those of Zach (2002), Prabha et al (2007) and Foster (2004) that colleagues play a role in assessments of enough information. However the nature of the collaborative approach to judging enough information has not been reported in the previous studies.

Parallels were also apparent in the absence of a decision in the form of a choice between two or more alternatives. The policy and research workers, using mental templates as guides, crafted their work products until they recognised them as fit for purpose, both for themselves and subsequently for their supervisors. Their experiences bore similarities to the ways in which the experienced workers studied by naturalistic decision making researchers did not evaluate and select from a range of options but drew potential responses to a situation from their existing repertoires of solutions, testing these potential solutions through a process of mental simulation and taking action as soon as they recognised a feasible option.

In summary**,** policy and research workers in the study experienced judgements of enough information as an iterative process of matching the information they had gathered to the mental templates they had developed of the tasks and the information required for task completion. The initial mental templates drew on individual experience, the experiences of colleagues and what was already known by the policy and research workers and their colleagues about the problems that generated the tasks. Through a process of gathering information, updating their work and seeking feedback from colleagues and supervisors, the policy and research workers updated their understanding of what was required and in turn, amended the mental templates of the tasks and the information needed. The process of assessment continued until the final feedback in the form of approval of the work products that signified de facto that enough information had been gathered.

7.2 Influences on judgements of enough information

Different factors were found to influence the policy and research workers' judgements of enough information in different ways and during the iterative process. These factors are summarised in three sections, as factors that influenced:

1. what constituted enough information
2. the recognition of enough information
3. the process of judging enough information.

7.2.1 Influences on what constitutes enough information

The work tasks themselves were major influences on what constituted enough information. As has been seen, the dimensions of the critical incident tasks were important scoping cues that shaped what information was needed. The task parameters and required information informed the mental templates against which enough information was judged. Although the nature of tasks and the formulation of task focus have been recognised as important factors in shaping information seeking behaviour (Bystrom and Jarvelin, 1995; Kuhlthau, 2004a; Vakkari, 2002), little attention has been given previously in the human information behaviour literature to how task focus and goals themselves are created.

Beyond the tasks, influences on what constituted enough information were apparent throughout the process, as they shaped the mental template which in turn shaped the information seeking of the policy and research workers. These influences were:

- different groups of people such as clients and stakeholders, and colleagues and supervisors whose feedback shaped what constituted of enough information at different points during the process
- the problems that triggered the tasks were themselves an indirect influence on what constituted enough information
- the decision making processes in the policy and research workers' organisations, coupled with the organisational approach to risk.

People

The role of other people in shaping work tasks, information seeking activities and judgements of enough information has not received a great deal of research attention. In this study however the views and feedback of different groups of people were important influences on the judgements of enough information, and in particular, on what constituted enough information. These groups were clients and stakeholders of the organisation, colleagues, and supervisors and senior staff in the policy and research workers' organisations. The influences of these groups showed up in the assessment of enough information in three ways.

The views of clients and stakeholders provided clues about the task dimensions and the information that would be needed, thus shaping the mental templates formed by the policy and research. Colleagues and supervisors provided feedback as to whether the templates and the information gathered were fit for purpose and subsequently, whether enough information had been gathered to complete the templates. Through the formal bureaucratic approval process supervisors and senior staff indicated that the information was sufficient and the task was complete.

The role of clients and stakeholders in shaping judgements of enough information is a factor that has not been reported in previous studies into enough information and stopping behaviour although it was noted by Zach (2005, p. 28) that for arts administrators, who also worked in a political environment, consultation with stakeholders was an important first step in scoping their information needs. The role of clients and stakeholders may not have emerged in previous studies because formal consultation with clients and stakeholders is a feature associated particularly with government agencies and previous studies of enough information or stopping behaviour have been conducted either with academics (Foster, 2004; Prabha, et al., 2007), students (Limberg, 1999; Parker, 2006; Prabha, et al., 2007) or lawyers (Kuhlthau and Tama, 2001).

Findings on the roles of colleagues and supervisors in shaping judgements of enough information however support those of earlier studies. The arts administrators studied by Zach sought the views of a 'trusted advisor' when assessing if they had enough information, although it is unclear if these were stakeholders or colleagues (Zach, 2002, p. 150). In a similar way, feedback from colleagues was reported as a stop rule used by academic researchers when deciding if they have enough information (Prabha, et al., 2007, p. 81). The discussion of enough information in these studies focused on the closing stages of the information seeking process and so the findings from these studies were unable to illuminate how the views of colleagues and supervisors may also have shaped the judgements of enough information. Feedback from colleagues was also reported as one aspect of the consolidation phase during which *knowing enough* was reported as a core process in Foster's (2004, p. 234) model of information seeking. However the feedback was associated with the experience of incorporating new

information into existing knowledge structures rather than with the experience of knowing enough, that is answering the question of whether or not they had ‘sufficient information to meet the present need’.

Problems

Also influencing the judgements of enough information at the beginning of information seeking were the problems themselves, those concerns that triggered a need for action that, in part, became the tasks assigned to the policy and research workers. As they scoped their tasks, the policy and research workers sought information on how the problems could be framed, why they were important, and how they had previously been handled. This kind of information, coupled with the views of clients and stakeholders, and colleagues and supervisors, helped establish the boundaries of the tasks themselves and indicated what matters needed to be included and what matters were to be avoided. In this scoping of the issues and the subsequent shaping of the mental templates of the tasks, the policy and research workers were, in a very preliminary way, beginning to determine what would eventually constitute enough information.

Task formulation has been recognised as an important stage in information seeking (Kuhlthau, 2004a; Vakkari, 2002) and the role of task in helping determine enough information has been reported (Kuhlthau, 2004a; Zach, 2002). However the relationship between tasks and the broader problems that generate them has not received substantial research attention previously. As a result the role of problems in shaping judgements of enough information has not been reported.

Decision making processes and approaches to risk in organisations

The nature of the organisational decision making processes was a third factor that influenced what constituted enough information for the policy and research workers. The process of preparing drafts for comment, and then seeking and incorporating feedback, firstly from colleagues and secondly, as the drafts became firmer, from supervisors, is a standard workflow in the public sector (Feldman, 1989, p. 12). Once the immediate supervisor approves the written work, drafts are sent up the line for the next level of comment and finally approval, in an iterative process that helped

supervisors crystallise their thinking about what information was needed to resolve the problems.

The strong but indirect influence of organisational decision processes in shaping what constituted enough information had not emerged in previous studies. Previous studies used data from participants who sought information in very different milieux or who were in different professional roles from the policy and research workers: students (Kuhlthau, 2004b; Limberg, 1999; Parker, 2006; Prabha, et al., 2007), academic researchers (Foster, 2004; Prabha, et al., 2007), and independent autonomous professionals such as lawyers (Kuhlthau and Tama, 2001). The students with their assignments, the academics with their teaching and academic papers and the lawyers with their court cases appeared to make assessments of enough information independently, although the academics studied by Prabha et al did draw on feedback from colleagues when deciding to stop seeking information to support their teaching activities.

There were however some similarities with the ways in which the senior arts administrators, whose responsibilities included decision making, (Zach, 2002) decided their information needs had been met. The experience of the policy and research workers reflected those of the arts administrators studied by Zach (2002, p. 154) who reported that these senior managers were aware of the impact of the organisation of their judgements about enough information.

Working within this layered, hierarchical decision making process created for the policy and research workers a sense of shared or deferred responsibility that minimised the sense of risk they experienced . Having done what they could with the information they had gathered and within the timeframes available, the policy and research workers were pragmatic about ‘letting the task go’. In this approach to risk management, the policy and research workers were exhibiting the satisficing behaviour that has been reported in nearly all other studies into enough information and stopping behaviour that informed this thesis.

The study findings on the organisational approach to risk have not been reported previously in human information behaviour research. Attitude towards risk is most often depicted in human information behaviour theory as an attribute of the individual (Taylor, 1991, p. 224; Wilson, 1999, p. 257). While risk profiles are undoubtedly individual, in this study, the organisational approach to managing risk, an approach that in a way shielded the individual policy and research workers, appeared to be a stronger influence than a individual sense of risk on the policy and research workers when making their assessments of what constituted enough information.

7.2.2 Recognition of enough information

As well as the direct and indirect influences on what constituted enough information for the policy and research workers, two other factors emerged from the study as influences on the ways in which they recognised they had enough information. These factors were:

- coverage of the topic and the key published sources of information
- organisational standards for the physical format of the finished product.

The influence of these factors was particularly prominent in the closing stage of the process of seeking and using information. However they also affected the assessment of enough information throughout the process.

Representative coverage of the literature suggested to the policy and research workers that they had enough information to fill in the pieces of the mental templates of the tasks they had developed, supporting similar findings by Prabha et al (2007, p. 81). However, unlike academic researchers (Prabha, et al., 2007, pp. 81-2) the policy and research workers were satisfied with less than exhaustive coverage of a subject or topic.

The ways in which the policy and research workers used organisational standards for the physical structures of their written work product and word or page lengths as a guide to how much information they would need and how in-depth a treatment would be required, paralleled the findings of Limberg (1999) and Prabha et al (2007. p. 81). Prabha et all reported that students used word limits and number of pages as stop rules

to end their information seeking. The use of physical formats and word limits reflected Limberg's (1999) category of enough information as a form of mechanical reduction.

The role of the standard organisational formats in specifying the shape of the work products of the policy and research workers is reflective of the role of 'genres of organisational communication' proposed by Yates and Orlikowski (1992). These two scholars identified several genres such as the memo and the business letter. To their list can be added briefing paper and discussion paper, genres of organisational communication associated with government departments and agencies. When making judgements of enough information, however, for the policy and research workers, these guides were used less as a signal to stop seeking information and more as shapers of the mental template fashioned at the beginning of the task which then played a role in the matching process that helped determine if enough information had been gathered.

The cues of coverage and physical format appeared to play a role similar to that of heuristics, that is rules of thumb which helped the policy and research workers assess when enough information had been gathered. In themselves though these cues did not act as a signal or stop rule to the end to information seeking. Unless the policy and research workers had developed mental templates against which to match the information gathered and had received feedback on the match between templates and information, the role of these informational cues was limited.

Other factors reported in earlier studies such as making sufficient effort and diminishing relevance of the information gathered (Kuhlthau, 2004a, p. 50) and boredom and physical discomfort (Agosto, 2001, p. 24) were not evident in the experiences of the policy and research workers. A reason for this could be the work-based nature of the information seeking of the policy and research workers compared to the more individual goals of information seeking by students (Agosto, 2001; Kuhlthau, 2004a) or lawyers (Kuhlthau and Tama, 2001).

7.2.3 Influences on the process of judging enough information

Factors in the third group of influences on enough information shaped the judgements of enough information in a more pervasive way through the iterative process in which the policy and research workers engaged. These factors were:

- the experience of the policy and research workers in their organisations
- time available for task completion.

Experience

Experience in the public sector generally and in their own organisations influenced the policy and research workers' judgements of enough information. They drew on their own experiences as well as those of colleagues and supervisors in their assessments of enough information. Experience guided the assessment of how much information might be needed for the work product and the determination of whether or not it was worth seeking more information. Experience also contributed to the confidence of the policy and research workers assessments of enough information.

The finding that experience increased the policy and research workers' confidence in their judgements of enough information supported findings from Zach's study of arts administrators. For this group, experience provided guidance on finding the balance when their degree of comfort with the amount of information found conflicted with the time available to seek more information.

As well as their experiences within their organisations the policy and research workers in the study relied on experience in the subject domains associated with their tasks. The use of subject domain experience bore similarities to the need for domain information needed to complete a task (Bystrom and Jarvelin, 1995, p. 195). By contrast the policy and research workers' organisational experience was used in ways that related more closely to the identification of the problem and its structure, and problem solving information, that is how the problem should be formulated and possible resolutions to it (Bystrom and Jarvelin, 1995, p. 195).

The study findings show some support for Vakkari's (1999, p. 829) inference that expertise 'leads to an increase in the pre-determinability of the task'. The expertise of

the policy and research workers was not explicitly investigated in this study and while expertise and experience are not synonymous, expertise does derive in part from experience in particular areas or with particular tasks. Study findings showed that the need to formulate mental templates that would serve as guides for both the tasks and the information needed to complete the tasks was apparent for both those policy and research workers with several years experience in their current positions and organisations and those without such experience.

Experience in policy and research work made it easier for the policy and research workers to formulate the mental templates. This finding suggests that the mental templates may to some extent be pre-determinable. However pre-determinability was related to the *framework* and *parameters* of the mental templates. In contrast the *reference points* and *parts of the puzzle* – those elements of the mental templates related to the topic information needed – were likely to be variable over time and so less likely to be pre-determinable.

Time Available

Contrary to a major theme in the literature that time available is an important factor in the assessment of enough information, in this study time available appeared to be less important to the policy and research workers in their assessments of enough information. Like most information seekers in the workplace, the policy and research workers were conscious of the time available for the tasks and as they worked and they were acutely aware of schedules and deadlines that had to be met. However, in contrast to findings reported by Agosto (2001) and Prabha et al (2001), the role of time as a factor in determining enough was less evident in the study findings.

For the policy and research workers in the study other factors such as the nature of the organisational decision making processes and organisational attitudes to risk meant that time available, while important in shaping their approaches to the critical incident tasks and in their calling a halt to their information seeking, was not a major influence on their judgements of enough information. Sometimes they submitted a work product that they knew did not have enough information, or they continued seeking information after the task itself had been completed, monitoring what they recognised would be an

ongoing issue. In this way, their behaviour parallels that of the arts administrators (Zach, 2002, p. 154) who were intensely aware of time as a constraint but for whom it was not a primary factor in judging enough information.

Similarities were also apparent with the findings reported by Parker on the experiences of high achieving post graduate students who as they became more engaged with their assignment tasks, also became less conscious of time as a constraint (Parker, 2006, p. 136). The policy and research workers however differed markedly from the postgraduate students in that for them, time did not have a motivational affect.

Consistency is emerging in the findings on judgements of enough information, in particular on the factors that are important in those judgements. Some similarities are evident in the ways that different groups of workers such as lawyers, academics, arts administrators and with this study, policy and research workers judge that they have enough information. However some distinct differences are apparent in the experiences of enough information of students.

7.3 Quality of the research

The methodological orientation and research design of the study have several implications for the credibility of the findings. A major strength of the case study approach was that intensive examination of the case, that is, the judgement of enough information was required. It was this detailed examination that resulted in a deeper understanding of the phenomenon of enough information as it is embedded in the process of information seeking, which in turn is embedded in the work task. The case study approach also required a detailed description and an in-depth understanding of the broader work context in which this activity was taking place. It was this level of detail that facilitated the emergence of new insights into the phenomenon of enough information.

Another strength derived from the interpretive orientation of the study. The interpretive stance also facilitated the emergence of new insights about enough information. This orientation and the ideographic nature of the case study approach meant that the

findings reported flow from the interpretations of this researcher. It is possible that other researchers may have seen, understood or reported the data differently. However new insights about judgements of enough information have emerged for the study. These insights include the role of mental templates against which to judge enough information, the iterative process of judging enough information and the dynamic nature of what constitutes enough information. Their emergence suggests that the researcher's interpretations have a level of credibility.

The study drew on data from a small number of participants, twenty one in all. While no ideal number governs the number of cases selected (Stake, 1995, p. 4), the relatively small number of participants is a reason to use caution when considering the applicability of these findings to other groups of information seekers. The participants were all volunteers and this may have also affected the nature of the data. Study participants represented only one professional group employed in a particular arena, the public sector, a further limitation of the research. Countering these limitations was the use of a multiple case study, which resulted in diversity in the organisations, gender and length of public sector experience of the participants, strengthening the plausibility of the findings. In all the research relied on 21 cases of the judgement of enough information rather than only one.

The use of interviews as the sole means of data gathering also has implications for the findings. At the time the study was designed, there appeared no other way of eliciting data on a phenomenon (the judgement of enough information) that is almost invisible to both observers and study participants. The use of critical incident technique and paired interviews was intended to reduce the effect of relying solely on interview data dependent on the participants' recall of events and experiences.

The naturalistic and interpretive approach taken, together with the corresponding qualitative techniques provide insights into the phenomenon of the judgement of enough information under study. All steps possible were taken to enhance the quality of the research within the constraints of a doctoral program with its goal of providing research training.

7.4 Directions for future research

This thesis was an exploratory study and an initial investigation of the judgement of enough information made by policy and research workers in a particular organisational setting. As with all exploratory research, much of the value of the study lies in the directions provided for future research.

One of the contributions made by the thesis was the recognition of the usefulness of naturalistic decision making theories in understanding judgements of enough information made while seeking and using information. An important next step is to test naturalistic decision making as a theoretical model and to evaluate its usefulness for human information behaviour research, not only for judgements of enough information but also for understanding how other judgements such as relevance assessments are made during information seeking and use. The naturalistic decision making models should be tested and evaluated both with this group of workers and with other groups of workers who extensively seek and use information because of the advantages they offer over classic models of decision making as choice among alternatives.

If the field of human information behaviour research is to continue to draw on human judgement and decision making theory, an accommodation between behavioural decision theory and naturalistic decision making should be fruitful. Although the policy and research workers, in common with some other information seekers whose behaviour has been studied empirically (Parker, 2006; Zach, 2002), did not appear to rely heavily on heuristics as stop rules, the relationship between heuristics and the judgement and decision making processes of naturalistic decision making needs more investigation.

The concept of ecological rationality and the use of adaptive heuristics that help people ‘search for information, stop their search and make decisions based on the information found’ (Todd and Gigerenzer, 2001, p. 381) may provide a bridge between these two fields of decision theory. The parallels between the situation-action matching process of naturalistic decision making and the cues used by particular groups in particular settings suggest a fruitful line of inquiry.

The incomplete tasks in the cases were intriguing and it may be that valuable lessons can be learnt from in-depth analysis of tasks such as these as well as successes in human information behaviour. Beyond testing the naturalistic decision making models, other research questions to be taken up include:

- do workers use approaches other than the development of mental templates when judging enough information for different types of problems or for different tasks and situations?
- do novice workers differ from experienced workers in the ways in which they make judgements and decisions while seeking and using information?
- are workers in different kinds of organisations influenced by different factors when judging enough information?

Situation awareness, the process of paying attention to salient cues in the environment and taking action based on anticipated future states, may offer a useful approach for extending understandings of judgement and decision making during human information seeking and use. The concept of situation awareness and its role in noticing and monitoring unfolding events was observed as early as 2001 (Cool, 2001, p. 23). However since that time, situation awareness has not received focused attention within the field of human information behaviour. What situation awareness may add to models such as Kuhlthau's (2004a) Information Search Process is a way of bringing to the fore the contextual factors that are in play and offering a way to elaborate the process Lievrouw (2001) termed 'informing'. Situation awareness has been used in the development of a framework to guide systems design for collaborative scientific research (Sonnenwald, et al., 2004) and the concept appears to have much to offer as an approach to modelling interactions between people and the systems they use. Collaborative information seeking and use is an important contemporary research direction for the field and further inquiry into the role of collaboration in judgements and decisions made while seeking and using information will be worthwhile.

The role of affect in work-based information seeking and use merits further investigation. While initially the scope of this thesis included an interest in the affective dimension of information seeking, concerns about the best way to draw out data on

affective responses in the workplace coupled with the need to contain the study, meant that this aspect of the judgement of enough information was not given detailed attention. Affect remains an intriguing aspect of the judgements of enough information, not least because the study findings suggest that the affective dimension of information seeking may be experienced differently when seeking information in work settings than, for example, when seeking information for educational or everyday life purposes. Investigation of interplay of affect, cognition and judgements and decisions during information seeking in the workplace merits attention.

Policy and research workers as a group are influential users of information (Gualtieri, 1999, p. 27; Rich, 1991, p. 321). Their information seeking and use practices merit further investigation in the form of longitudinal research and through more detailed study of their experiences, perhaps using ethnographic techniques to capture the full experience of preparing a major paper or a research report irrespective of the success or effectiveness of the outcome.

7.5 Contributions to the study of human information behaviour

This thesis has contributed to the development of the field of human information behaviour research in three ways. Firstly the thesis has made an in-depth study of the phenomenon of judgements of enough information, the first research in the field of human information behaviour that has focused *solely* on this concept. Secondly, a previously unstudied group and site formed the setting for this investigation into the phenomenon of enough information. As a group of knowledge workers, policy and research workers have been little studied, with Feldman's (1989) research, from the theoretical perspective of decision making, being the other investigation into how this group of workers uses information. The contextual analysis of the information use environment of the policy and research workers in Chapter 5 provides a rich picture of the information seeking and use behaviour of this group of knowledge workers.

The thesis has built particularly on findings from two previous empirical studies that investigated enough information and stopping behaviour in the workplace (Kuhlthau

and Tama, 2001; Zach, 2002) as well as several other studies of enough information in educational settings (Kuhlthau, 2004a; Limberg, 1999; Parker, 2006; Prabha, et al., 2007). The research questions that shaped the study have not previously been investigated in this setting, that is, the public sector, and as a result, this unique multiple case study has brought new knowledge to the field of human information behaviour. As a result, the thesis findings have built on and extended existing knowledge on this phenomenon.

Thirdly, as result of the careful examination of human judgement and decision making theory, which has underpinned much of the recent research into enough information and stopping behaviour, the thesis has introduced the theories of naturalistic decision making to the field of human information behaviour, providing a different theoretical perspective from which to investigate judgements and decisions made during information seeking and use. These contributions and their implications for the field are examined in this section.

7.5.1 Contribution to human information behaviour research

While the iterative, fluid and negotiated nature of assessments of enough information have been reported previously, the thesis has extended the earlier findings by revealing the detail of how this iterative process of questioning, *is it enough?* unfolds. In particular the thesis has clarified the ways in which task, recognised as an important influence on information seeking behaviour in the early stages of information seeking, is also critically important throughout the entire process of seeking and using information. Tasks together with the information required to complete the tasks formed the mental templates against which ongoing assessments are made of whether or not enough information has been gathered.

The study has also extended knowledge in the area of collaborative information seeking and use. To date much human information behaviour research has focused on the individual information seeker. The ‘collective aspects of human information behaviour’ have received little research attention (Talja and Hansen, 2006, p. 113) although the role of collaboration in information seeking and use has been reported previously (e.g. Kuhlthau, 2004a, p. 135). However there has been limited research into collaborative

information behaviour in professional settings (Talja and Hansen, 2006, pp 119-20). While the study was not conceived as an investigation into collaborative judgement and decision making while seeking and using information, the findings nonetheless add to the growing empirical data on the 'collective aspects' of information seeking and use.

The policy and research workers collaborated in developing shared interpretations of the problems being tackled, the current situations, the options for problem resolution, the information available and in the end, of what constituted enough information. The collaborative nature of the judgements of enough information were revealed in the iterative action / feedback loops of the policy and research workers' information seeking, assessment and use. The findings provide support for previous research (e.g. Fidel, et al., 2004; Hansen and Jarvelin, 2005) that found that workers collaborate *throughout* the process of seeking and using information, from the initial task formulation phase through to the closing phases. As the study findings reveal, workers also collaborate in making judgements of enough information.

As a relatively recent direction in human information behaviour research, collaborative information behaviour demands new ways of modelling human information behaviour (Talja and Hansen, 2006, p. 114). The approaches and frameworks used by researchers in the field of naturalistic decision making, discussed in *Section 7.5.2: Contribution of naturalistic decision making to information behaviour research* may provide fruitful models for ongoing study into how collaborative judgement and decision making unfolds while seeking and using information.

In the iterative collaboration on the problems, tasks, information and judgements of enough information the policy and research workers can be seen engaging in recursive dialogue with the contexts in which they operated. The active consultation with stakeholder groups as the intended audience of their work products and the consideration and anticipation of the ways in which their work would be received by these groups are further examples of this recursive dialogue in action. The meta-theoretical underpinnings of the thesis discussed in *Section 3.2.1: Relationship between people and contexts* make clear the assumption that the judgement of enough information was understood as a cognitive activity that is embedded in and shaped by

an individual's social milieu. Although in the end the judgement of enough information was made individually by one individual at a particular point in time, it was in effect a collaborative judgement.

Adding insight into the nature of the recursive dialogue between individuals and contexts, the findings on the ways in which policy and research workers used the standard organisational formats and sizes of briefing papers etc is reflective of the role of communication genres (Yates and Orlikowski, 1992) and contribute to an enriched understanding of how individuals and information work practices shaped each other. Yates and Orlikowski proposed that genres of communication evolve through an ongoing recursive relationship between organisational work practices and individuals' actions. The policy and research workers drafting and redrafting of briefing papers and reports coupled with the decision making processes within the organisations were the work practices through which the views of colleagues, supervisors and stakeholders shaped what constituted enough information.

The examination in the thesis of the empirical findings on judgements of enough information within the framework of human judgement and decision making theory has resulted in two theoretical contributions to the field of human information behaviour research. Firstly, building on the understanding of the judgement of enough information as an iterative process, the study's findings support the conceptualisation of the assessment of enough information as a judgement that precedes and feeds into the decision to stop seeking information. Early decision theorists such as Simon (1965, p. 35) understood judgements and decisions as different phenomena. While some human information behaviour researchers have also recognised the distinction (e.g. Wang and Soergel, 1998, p. 117) others in more recent studies of enough information and stopping behaviour have not always distinguished between the two phenomena in their research. Those researchers whose work on enough information was informed by decision theory have treated the phenomenon of enough information as a decision which they analysed in terms of stop rules or heuristics such as redundancy of information (Prabha, et al., 2007, p. 81; Zach, 2002, p. 30). However conceptualising the judgement of enough information and the decision to stop as related but distinct phenomena should help

human information behaviour researchers develop a more fine-grained understanding of the complex inter-relationships between the two phenomena.

Secondly, the evaluation of the human judgement and decision making theory has led to the conclusion that, although much recent investigation of enough information and stopping behaviour has been based on behavioural decision theory, this school of decision theory alone is inadequate in fully explaining how people make the judgement of enough information. Decision theory has informed human information behaviour research since researchers such as Kantor (1987) and Kraft and Waller (1981) sought to discover the optimal stopping point in a sequential search of a database and features in the research interest in the use of heuristics in information search and retrieval (Bates, 1981, pp. 153-4; Wang and Soergel, 1998, pp. 117, 127). A number of the recent investigations into enough information and stopping behaviour have continued to draw on concepts from behavioural decision theory such as stop rules, decision rules and heuristics to explain judgements of enough information and stopping behaviour.

However the findings of the research that informs this thesis suggest that stop rules and heuristics are insufficient to fully capture the complexity of how judgements of enough information are made. The field's reliance on the theory of behavioural decision alone to explain judgement and decision making while information seeking may limit its understandings of this complex behaviour. This conclusion in turn led to the exploration of the theories and models of naturalistic decision making and the realisation that this area of decision theory has much to offer human information behaviour researchers.

7.5.2 Contribution of naturalistic decision making to information behaviour research

The iterative process and fluid nature of the judgements of enough information reported by this researcher and others (Kuhlthau, 2004a; Parker, 2006; Zach, 2002) have much in common with the process models developed by naturalistic decision making researchers. Researchers in the field of naturalistic decision making have developed and elaborated a number of models, including the Recognition Primed Decision model (Klein, 1997, p. 15) and the skills/rules/knowledge hierarchy (Rasmussen, 1997, p. 158). It was not the intent of the empirical study to test the models of naturalistic

decision making. However the experiences reported by the policy and research workers were reflective in particular of the model of Recognition Primed Decision Making.

The Recognition Primed Decision model describes how decision makers respond to situations in changing contexts by diagnosing the situations in which they are operating and evaluating possible courses of action (Klein, 1997, p. 286). Like the decision makers described by Klein, the policy and research workers invested substantial amounts of time in assessing and diagnosing the situations in which they were operating. The information they gathered in the early stages of their information seeking was used to develop the mental templates of task and information needed and against which the judgements of enough information were made.

As they gathered information, the policy and research workers sought advice and feedback from colleagues and supervisors about the adequacy of the information, assessing and reassessing the course of action they were following and seeking cues that signalled they had enough information. The policy and research workers continued to evaluate their actions, checking if the action was working (that is, were they gathering enough information) and modifying their approach throughout the iterative of process of seeking information and judging if they had enough information.

Behavioural decision theory has enabled significant advances in understanding decision making during information seeking and use. The present dominant decision theory, behavioural decision theory, poses several challenges of particular significance for human information behaviour researchers. One major drawback associated with behavioural decision theory is the reliance of research findings from mathematical models and experimental studies. A second limiting factor is the strong focus on the cognitive activity of the individual, a focus that is related to the genesis of behavioural decision theory in the field of cognitive psychology. As a result of this focus, behavioural decision theory-based research often artificially removes all the ‘typical confusions and pressures’ of the real world, the ‘missing information, time constraints, vague goals and changing conditions’ (Klein, 1998, p. 1), the contextual factors that researchers have acknowledged are essential for understanding human information

behaviour, and particularly, for understanding assessments of enough information (Kuhlthau, 1999a, p. 18).

Although much naturalistic decision making research has been with military personnel or emergency workers such as fire-fighters, the central interest in the research has always been how *experienced* people make decisions in complex, dynamic, real-world settings. The policy and research workers clearly are not military or emergency personnel. However both in the settings in which they carried out their task-based information seeking and use and in the ways in which they made judgements of enough information, parallels were apparent with the findings from naturalistic decision making research. The ambiguous, value-laden and convoluted nature of public policy making described in *Section 5.2: Problems and problem resolution*, the settings characterised by risk and uncertainty in which the policy and research workers sought and used information described in *Section 5.3: Settings* and the vague and ill-structured goals aimed at resolving problems described in *Section 5.5: Tasks* revealed an information use environment characterised by complex and dynamic problems and work tasks.

The information use environment of the policy and research workers displayed strong similarities with the dynamic and complex settings in which much naturalistic decision making research has been conducted. The influence of organisational goals and norms were revealed in the ways in which the decision making processes of the agencies, the importance of previous positions on problems shaped the policy and research workers' mental templates of task and information needed and the collegiate and supervisory feedback were influential on judgements of enough information. The iterative nature of information seeking and use and judgements of enough information – the iterative seeking of information, drafting work, assessing and checking if enough information has been included and then seeking more are indicative of the action / feedback loops described in naturalistic decision making findings and the ongoing situation assessments. The collaborative nature of their information seeking and use and their judgements of enough information, demonstrated in the ways in which the policy and research workers sought advice and feedback from colleagues and supervisors, was also reflective of naturalistic decision making findings. Finally, the ways in which the policy and research workers formed mental templates of their tasks and information needed,

templates that would enable them eventually to determine if they had gathered enough information, are reflective of the mental models described in naturalistic decision making research findings.

The major differences between the contextualised judgement and decision making studied by naturalistic decision making researchers and the judgements of enough information made by the policy and research workers were the tight but unknown timeframes in which military and emergency personnel often find themselves working and the degree of risk associated with the judgements and decisions. Despite the difference in degree in timeframes and risk, clear parallels exist between the decision making processes of the experienced personnel commonly studied by naturalistic decision making researchers and the experiences of judgements of enough information reported by the policy and research workers.

The naturalistic decision making approach builds on the key tenets of behavioural decision theory such as the constraints of time and cognitive capacity and the use of heuristics while expanding the research horizon to encompass the whole process. For human information behaviour researchers the explicit recognition by the naturalistic decision making approach of the criticality of contextual factors in shaping decision making (Montgomery, et al., 2005) is an important theoretical development.

The continued focus of human information behaviour research on enough information and stopping behaviour at the moment of choice has unnecessarily limited researchers' capacity to see and understand how the process of judgement and decision making unfolds. Findings from the current study suggest that focusing on a single moment of choice in a more complex process necessarily constrains our understanding of how that choice or action has come about, since such a focus ignores what precedes that action and often the context in which it happens. As well, the iterative nature of judgements and decisions made during information seeking and use are not a comfortable fit with the behavioural focus on the moment of choice.

The narrow focus on the rules used in decisions to stop seeking information has meant that researchers have not been able to fully tease out and understand either the nature of

the relationship between enough information and stopping behaviour, or how other factors interact with these two phenomena. As a result, the way in which task, for example, shapes judgements and decisions at the end of information seeking has not previously been fully realised.

The naturalistic decision making approach provides an expanded horizon and a different broader perspective of the phenomena of judgement and decisions while information seeking. It offers the prospect of enriched understandings of the judgements and decisions made by information seekers by exposing to scrutiny the periods of tentative exploration of vague unformed pathways and the attempts to bring order to unruly ideas that precede the moment of choice. If researchers aim to understand human information behaviour in context then they need to use research approaches that explicitly encompass context. Naturalistic decision making provides a conceptual framework which embraces both the moment of judgement or decision and the contextual factors that shape those phenomena.

7.5.3 Contribution to information management practice

In addition to the theoretical contribution to the field discussed in *Sections 7.5.1: Contribution to human information behaviour research* and *7.5.2: Contribution of naturalistic decision making to information behaviour research*, the study findings have implications for the practice of information and knowledge management, particularly in government agencies. For information management professionals working in these agencies, the findings provide insights into how best to support the work of this important group of public officials. Only two of the eleven agencies provided the support of a traditional library or resource centre for their staff and even in these agencies, the policy and research workers reported rarely using the services of these centres, primarily because of the short timeframes within which they were operating.

The policy and research workers would however benefit from access to the skills and experience of trained information and knowledge management professionals. The extent to which the policy and research workers re-purposed information and their reliance of a wide range of information sources, including the advice and feedback of their colleagues, suggest that information and knowledge management professionals are able

to make substantial contributions to more effective and efficient access to and use of information in government agencies.

That professional support should be delivered at the point of need. The study findings add weight to the argument that information and knowledge management professionals working in organisations must move out of their resource centres as their public library colleagues have done (e.g. Durrance, et al., 2006) and embed themselves in work teams as those teams are formed. Information management professionals need to become more active partners with workers such as policy and research workers. The influence of the development of the mental template on the information that is needed to complete the task suggests that information and knowledge management professionals also need to understand the importance of participating in the scoping stage of the project or task. Such active engagement with policy and research workers in the early stages of the process will enable information and knowledge management professionals to anticipate information needs rather than wait for requests that may never come, to use their expertise to support workers at every stage of their information seeking and use, as well as to gain insights into contextualised information seeking and use behaviour that will lead to the development of new services.

Beyond the implications for the practice of information and knowledge management professionals, study findings also reveal insights into the type of information and communications technology or systems support required for information seeking and use within the information use environment of the policy and research workers. Workplaces are increasingly dominated by electronic communication, with social networking tools (Baltatzis, et al., 2008) increasingly taking a prominent role.

The study findings add emphasis to previous calls for information systems and software design that will support iterative, collaborative and negotiated seeking, assessment, use and re-use of information (Barr, et al., 2005; Blake and Pratt, 2006; Hansen and Jarvelin, 2005). The analysis of the information seeking and use behaviour of the policy and research workers showed them moving between seeking information from the web, databases, corporate records in electronic and paper form and their colleagues. In particular the findings on the primacy of task in shaping judgements of enough

information and the iterative nature of the process of judging enough information have implications for systems design and software acquisition by organisations. The findings on the collaborative approach to making the judgement of enough information enrich the field's understanding of this phenomenon and should help systems designers in their efforts to support work process.

Many of the information seeking activities described in Chapter 5 are supported by software and functionality available in web browsers and existing information and communications technologies and systems. More challenging for systems design is the development of information and communications systems to support the contextualised use dimension of information seeking and use. However tools associated with social networking such as software to support virtual reference services, tagging, and the collaborative development of work products through wikis, are increasingly available to support the iterative seeking and use of information depicted in this thesis. Such interactive tools enable workers to move between seeking information, sharing what they have located, as well as their assessments of it, and collaborating with co-workers and associates in constructing meaning from it, in re-purposing it and in sharing it again. Where systems designers are crafting new solutions, the rich insights into the information seeking and use behaviour of policy and research workers can inform the development of sensitive, user-focused information.

Study findings suggest that information and knowledge management professionals working in government agencies would be well served by re-imagining their service role to one that encompasses sourcing information from any source – databases, the web, corporate records, intranet directories and knowledge bases – so that a holistic and seamless service can be provided. Not all the resources used by the policy and research workers were digital – the degree to which they relied on advice/feedback from colleagues and their agency's corporate records, often still in paper form, suggest that not all their information needs will be met by electronic resources. However a distributed information service could be largely delivered and mediated electronically. Such a distributed service would create opportunities for information and knowledge management professionals to provide support both in helping policy and research

workers keep their own professional knowledge bases current and in support the more immediate needs generated by requests for briefings or issues papers.

7.5.4 Contribution to research design in human information behaviour studies

The study has also made a contribution to research design in the field of human information behaviour research in two areas: the use of paired interviews and the exploration of an unusual case. Paired interviews have been most often used in research into relationships such as between marital partners, or carers and dependents. Paired interviews have been less frequently used where no existing relationship is found and have extremely limited use in human information behaviour research. However the study has demonstrated that the use of paired interviews was both practicable and of value as a technique to aid participants' recall of their experiences of information seeking and use.

The study has also contributed methodologically through its examination of an unusual case. Although case study researchers recognise that a case may be an individual or an program, an event or an entity, in human information behaviour research, case study units of analysis have more often been users of information, for example investigations into the information behaviour of academics, or an activity, for example information retrieval or environmental scanning.

7.6 Contribution to understanding public policy making processes

The thesis has contributed new knowledge to the field of public policy by providing rich insights in how one group in the public policy making process influences the ways in which research findings inform policy development. These insights, derived from the contexts in which judgements of enough information were investigated, are not central to the focus of the thesis. Nonetheless the findings contribute to an expanded understanding of the processes of public policy making.

As members of one policy community (Stone, et al., 2001, p. 33), the policy and research workers were revealed as an influential group taking a 'knowledge broker' role (Nutley, et al., 2007, p. 63) in the policy process. In this role they communicated research findings to policy makers by drawing together information from a range of sources. In carrying out their work tasks, the policy and research workers acted as a conduit between research and policy communities. The empirical findings support those of Gualtieri (1999, p. 27) who concluded that the public servant or political advisor who has done the research – the sourcing, interpretation and presentation of the information – plays an influential albeit somewhat neglected role in the process of public policy making.

Most opportunity for research to inform practice arises during the policy analysis dimension of policy making, as policy workers gather data, clarify objectives and develop options (Edwards, et al., 2001, p. 4). The empirical findings on the iterative process of seeking, assessing and using information in preparing their papers and reports provide rich insights into the fluid, dynamic and recursive ways in which policy and research workers, a neglected group of participants in the public policy process, actively engage with information in a variety of forms and ways, assess and interpret information and draw this information into the process of developing policy. The study findings support a view of policy making as a process involving participants in 'construct[ing]" and "sustain[ing]'policy (Colebatch, 2002, p. 4). This view of policy work locates information as a "constitutive force in society" (Braman, 1989, p. 239), that is, with an 'active role in *shaping* context'(original italics).

The diversity of information sources and channels used by the policy and research workers and the iterative manner in which these workers sought and used information to prepare their work products adds to the field's understanding of the policy process as it unfolds within government departments and agencies. In mapping the information behaviour of the policy and research workers, the findings from the empirical study illuminate at least one of the paths along which research finds it way into policy making processes.

Much of the earlier research interest in the research/policy nexus has focused on how academic and social researchers can increase use of research findings in policy development (e.g. Weiss, 1977). Attention has been focused on understanding the nexus as a relationship between individuals (Nutley, et al., 2007, p. 89), that is, the individual researcher and the individual policy maker.

The study findings on the influences on the information seeking and use of policy and research workers and on their judgements of enough information respond to Nutley et al's call (2007, p. 89) for more studies of research use in policy at the organisational level. Further the findings on the ways in which factors such as organisational decision making processes and the views of colleagues and supervisors influenced the policy and research workers' assessments of what constituted enough information revealed aspects of the 'faming and norm-setting' (Colebatch, 2002, p. 122) which shape policy and addresses calls by Nutley et al (2007, p. 89) for a more nuanced and in-depth understanding of how context shapes research use in policy.

Coupled with recognition of the value of naturalistic decision making in developing more nuanced understandings of how judgements and decisions are made, the study findings provide support for the argument that scholars interested in the use of research in informing public policy development will be well served by moving beyond the traditional linear models based on 'researcher/research user interactions' and 'individualised framings of research use' (Nutley, et al., 2007, p. 119) towards models that explicitly acknowledge the role of collaborative action in developing shared understandings of policy problems and potential resolutions.

Study findings have also provided an in-depth analysis of the information sources used by the policy and research workers, their information seeking and use behaviour, the ways in which they assess whether or not they have enough information, and the range of factors that influence their information behaviour. From these findings the thesis expands and enriches the public policy field's understanding of this important but neglected aspect of the policy process.

In conclusion the thesis has explored the phenomenon of the judgement of enough information as experienced by policy and research workers completing work tasks. The judgement of enough information was revealed as an iterative process that begins with the development of a mental template against which assessments of enough information are made while seeking and using information. In the workplace setting of the study a number of factors influenced the judgement of enough information throughout that process.

Beyond the study findings of the policy and research workers judgements of enough information, the thesis has clarified the relationship between the judgement of enough information and the decision to stop seeking information. The thesis has also extended the research repertoire of the field of human information behaviour by introducing naturalistic decision making. Naturalistic decision making offers a theoretical approach that facilitates the examination of the phenomena of judgements and decision making in a richer and more contextually embedded way leading in turn to the development of more nuanced understandings of how people make judgements and decisions while seeking and using information.

Appendices

Appendix One: Glossary

Assessment. Used synonymously with judgement.

Colleagues. Other staff members within the organisation, and working at a similar or lower level in the organisational hierarchy

Context. A subset of environment that comprises those factors seen as relevant and salient to an activity or a task.

Decision. Classically defined as the choice between two or more alternatives.

Environment. All factors that are not the individual actor, or in the case of research, the phenomenon under investigation.

Information. This term was not pre-defined since the researcher sought to understand how the study participants viewed and interpreted the concept.

Judgement. The act of assessing and evaluating options or actions.

Mental Template. The term *mental template* was assigned to describe the cognitive representation developed by the policy and research workers as they began their tasks, carried out their information seeking and made iterative assessments of enough information. The term was chosen to avoid similar terms in common usage, such as mental models or frameworks since these commonly used terms are used in different literatures in different ways. The research was not seeking to prove or disprove use of such cognitive models and the researcher wanted to minimise bias her analytic and interpretive work by avoiding short hand thinking that might flow from using common terms. Template was chosen in preference to other terms such as map or blueprint because the researcher felt the concept of a template permits the meaning of a more flexible guide than do the other terms. The term seemed to best capture the experience of the policy and research workers and the intention of the researcher.

Papers – Issues, Discussion, etc. The preparation and dissemination of papers (issues papers, discussion papers, consultation drafts) is an activity aimed at drawing together the key points around an issue for discussion or for responses within organisations or from external parties such as stakeholder groups.

Situation awareness. The acts of perceiving cues in the environment that are salient to a task, developing a snapshot of what is happening, and making predictions about what might take place as the situation unfolds. (From Endsley, 1995).

Situation. A set of circumstances at a particular time.

Stakeholder. Stakeholder is the term used to describe an individual or an organisation or a group that has an interest in an issue, an action or a decision. Stakeholders may be directly affected by the issue, action or decision or they may have an indirect connection with the issue, action or decision for example holding political power that may influence the outcomes.

Stopping behaviour. In the literature, user determination of the end of an information retrieval search. In the thesis, the term is used to describe any and all behaviour associated with the closing stages of information seeking.

Stopping rules. Cues or heuristics seen to govern the decision to stop seeking further information.

Supervisors. Staff members within the organisation, who supervised the work of study participants

Task. 'Task is usually seen as a purposeful set of linked concrete or cognitive activities performed by people (or machines); normally, it has a meaningful purpose as well as an identifiable beginning and end' (Bystrom, 2007, no pagin.)

Appendix Two: Ethics Approval

Research & Commercialisation Office

PO Box 123
Broadway NSW 2007
Australia

Tel +61 2 9514 9681
Fax +61 2 9514 1244

UTS CRICOS Provider Code 00099F

University of Technology, Sydney

15 Mar. 05

Theresa Anderson
CB02.7.58
Faculty of Humanities and Social Sciences
UNIVERSITY OF TECHNOLOGY, SYDNEY

Dear Theresa,

UTS HREC REF NO 2005-0014 – ANDERSON, Dr Theresa, KIRK, Professor Joyce, BERRYMAN, Ms Jennifer, (PhD student) - "Judgments during Information Seeking"

At its meeting held on 08/03/2005, the UTS Human Research Ethics Committee considered the above application, and I am pleased to inform you that ethics clearance has been granted.

Your clearance number is UTS HREC REF NO.2005-014A

Please note that the ethical conduct of research is an on-going process. The *National Statement on Ethical Conduct in Research Involving Humans* requires us to obtain a report about the progress of the research, and in particular about any changes to the research which may have ethical implications. This report form must be completed at least annually, and at the end of the project (if it takes more than a year). The Ethics Secretariat will contact you when it is time to complete your first report.

I also refer you to the AVCC guidelines relating to the storage of data, which require that data be kept for a minimum of 5 years after publication of research. However, in NSW, longer retention requirements are required for research on human subjects with potential long-term effects, research with long-term environmental effects, or research considered of national or international significance, importance, or controversy. If the data from this research project falls into one of these categories, contact University Records for advice on long-term retention.

If you have any queries about your ethics clearance, or require any amendments to your research in the future, please do not hesitate to contact the Ethics Secretariat at the Research and Commercialisation Office, on 02 9514 9615.

Yours sincerely,

Production Note:
Signature removed prior to publication.

Professor Jane Stein-Parbury
Chairperson, UTS Human Research Ethics Committee

Office: City campus, Level 7, Room 719, No 1 Broadway Sydney NSW 2007
Campuses: City, Kuring-gai, St Leonards

Appendix Three: Correspondence with Participants

Faculty of Humanities and Social Sciences
PO Box 123
Broadway NSW 2007

Name of Chief Executive
Address

20 June 2005

Dear ……. ,

My name is Jennifer Berryman and I am enrolled in the PhD program of the Faculty of Humanities and Social Sciences, Information and Knowledge Management Program, at the University of Technology, Sydney. I am completing the PhD part time, while working as a policy officer at the State Library of NSW.

My thesis research in the field of library and information science looks at how people make judgments and decisions when seeking information in the workplace. I have put in place steps to preserve the anonymity of the people and organizations involved in the research and the confidentiality of the information given to me by the participants in the project. These steps have been approved by the UTS Human Ethics Committee and the University (UTS HREC REF NO 2005-0014).

The people I am studying are public sector staff involved in research and analysis relating to public policy. I am studying this group because they both use information as an input to the policy process and generate information in the work they produce.

Why am I approaching your organisation?
I have discussed NSW public sector agencies that I might approach with <name deleted>, who is <position, organisation name deleted>. The Department of …….. is one of the agencies suggested and I am now approaching you about the possibility of interviewing one or more members of staff in your organisation who do this kind of public policy research and analysis work.

What is involved?
The research would involve your staff members in two interviews. During the first interview (about 30 minutes), I will be asking questions designed to provide me with

background on the role and nature of the work being done by participants. This interview would involve the members of your staff individually.

The second interview (about 45 minutes) will focus on the information needed by participants to do their work and how they go about finding and using that information. I will be interviewing the participants in pairs. Because people from different organizations will constitute the pairs, both participants will be asked to sign confidentiality agreements. The interviews will be taped and I will transcribe them. The tapes, transcripts and data analysis material will be archived for possible future use in accordance with UTS policy.

Possible benefits to your organisation

There is renewed interest in the nexus between research and policy and more particularly the extent to which research is used in policy development and analysis. I expect that the findings of this project, which focuses on a key aspect of the way that policy officers approach their work, will contribute to informed debate on this issue. I will be happy to present the findings to you and later to the staff of your organisation, if you wish.

If you feel your organisation and some of your staff are able to be involved in this research, or you would like more information about the project, I would be pleased to discuss further details with your nominee. I can be contacted, preferably by email, at Jennifer.M.Berryman@student.uts.edu.au, or on [redacted]. My supervisor, Dr Theresa Anderson can be contacted at Theresa.Anderson@uts.edu.au, or on 02 9514 2720. The UTS Research Ethics Officer can be contacted on 02 9514 9615 or via email, Research.Ethics@uts.edu.au.

Yours sincerely,

Jennifer Berryman.
PhD Candidate, Information and Knowledge Management Program
Faculty of Humanities and Social Sciences
University of Technology, Sydney
Jennifer.M.Berryman@student.uts.edu.au

June 2005

JUDGMENTS DURING INFORMATION SEEKING

INFORMATION LETTER

WHO IS DOING THE RESEARCH?

My name is Jennifer Berryman and I am PhD student at UTS. My supervisor is Dr Theresa Anderson.

WHAT IS THIS RESEARCH ABOUT?

This research is to find out about information seeking in the workplace, particularly what happens at the end of the information seeking process.

IF I SAY YES, WHAT WILL IT INVOLVE?

I will ask you to talk about your experiences during two interviews (approximately 30 minutes and 1 – 1 1/2 hours. During the first interview, I will ask you about the nature of the organisation you work for, the work you do there and how you look for the information you need to do your work. During the second interview, I will ask in more detail about the information seeking you do.

ARE THERE ANY RISKS?

There are few if any risks because the research has been carefully designed to reduce the change of risk or harm. However, during the second interview, I will be asking the questions of you together with one other participant in the research. I will let you know who that is before the interviews begin. This means that others will hear what you have to say. The interviews will be taped and I will transcribe the tapes.

I have taken steps to protect your privacy and the confidentiality of the information you provide. These include:

- protecting your identity within the organization
- using codes for the names of participants and their agencies
- requiring both participants to sign confidentiality agreements
- limiting access to the information you provide. Only you as the participant, the other participant in the paired interview and I as researcher will have access to the information you provide, except in the circumstance it is subpoenaed.

The tapes, transcripts and data analysis material will be held for five years, in accordance with UTS policy and will then be archived securely within the Faculty of Humanities and Social Sciences and the home office of the researcher.

WHY HAVE I BEEN ASKED?

You are able to give me the information I need to find out about how people make judgments and decisions when looking for information in the workplace. I am studying policy and research workers because they both use information as an input to the policy process and generate information in the work they produce.

DO I HAVE TO SAY YES?

You don’t have to say yes.

WHAT WILL HAPPEN IF I SAY NO?

Nothing. I will thank you for your time so far and won’t contact you about this research again.

IF I SAY YES, CAN I CHANGE MY MIND LATER?

You can change your mind at any time and you don’t have to say why. I will thank you for your time so far and won’t contact you about this research again.

WHAT IF I HAVE CONCERNS OR A COMPLAINT?

If you have concerns about the research that you think I or my supervisor can help you with, please feel free to contact me via email: Jennifer.M.Berryman@student.uts.edu.au or my supervisor, Dr Anderson, on 9514 2720 or Theresa.Anderson@uts.edu.au

If you would like to talk to someone who is not connected with the research, you may contact the Research Ethics Officer on 02 9514 9615, and quote this number (UTS HREC REF NO 2005-0014)

Thank you for your time.

JUDGMENTS DURING INFORMATION SEEKING: THESIS RESEARCH
Participant Consent Form

I _____ agree to participate in the student research project *Judgments during Information Seeking*, (UTS HREC REF NO 2005-0014) being conducted by Jennifer Berryman, a doctoral student in the Faculty of Humanities and Social of the University of Technology, Sydney (email to Jennifer.M.Berryman@student.uts.edu.au).

I understand that the purpose of this study is to explore how people make judgments and decisions when looking for information in the workplace.

I understand that my participation in this research will involve two interviews covering my own experiences of information seeking in the workplace and the ways in which I make judgments during that activity. The first interview is expected to take approximately 30 minutes and the second, 45 minutes to one hour. I understand that the second interview will be conducted in pairs and that I may need to travel to meet the other participant for the second interview. I understand the researcher will make the decision about the pairing and will advise me who the other participant will be.

I understand I will be required to sign a confidentiality agreement relating to the information disclosed during the second paired interview, to protect the privacy of both participants and the confidentiality of the information we provide. I understand that I will be audiotaped during the interviews and that the audiotape will be transcribed by Jennifer Berryman.

All data will be labelled anonymously and stored securely. I understand the data will be archived for possible future use.

I am aware that I can contact Jennifer Berryman or her supervisor, Dr Theresa Anderson (telephone 02 9514 2720 or email Theresa.Anderson@uts.edu.au), if I have any concerns about the research. I also understand that I am free to withdraw my participation from this research project at any time I wish and without giving a reason.

I agree that the research data gathered from this project may be published in a form that does not identify me or the organisation in which I am employed in any way.

_____ ____/____/____
Signature (participant)

_____ ____/____/____
Signature (researcher or delegate)

NOTE:
This study has been approved by the University of Technology, Sydney Human Research Ethics Committee. If you have any complaints or reservations about any aspect of your participation in this research which you cannot resolve with the researcher, you may contact the Ethics Committee through the Research Ethics Officer (ph: 02 9514 9615, Research.Ethics@uts.edu.au) and quote the UTS HREC reference number. Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

JUDGMENTS DURING INFORMATION SEEKING: THESIS RESEARCH

PARTICIPANTS' CONFIDENTIALITY AGREEMENT

I have agreed to participate in a joint interview for the research project *Judgments during Information Seeking.* This project is being conducted by Jennifer Berryman, who is an enrolled student in a PhD program at the University of Technology, Sydney (Jennifer.M.Berryman@uts.edu.au). The principal supervisor is Dr Theresa Anderson (Theresa.Anderson@uts.edu.au).

I agree to the following undertakings and conditions of ethical research practice as they relate to this joint interview with Jennifer Berryman:

1. I undertake to protect the privacy of both the other participant and the organisation they represent.
2. I undertake to maintain the confidentiality of the substance of the interview.
3. I undertake to reveal the identities of the people and the organisations named in the interviews only if required to do so by law.

I understand that the UTS Human Research Ethics Committee has approved these undertakings and conditions.

Signed by
(Name)

Date

Witnessed by
(Name)

Date

Appendix Four: Transcriber's Confidentiality Agreement

UNIVERSITY OF TECHNOLOGY SYDNEY

***JUDGEMENTS DURING INFORMATION SEEKING*: THESIS RESEARCH**

TRANSCRIBER'S CONFIDENTIALITY AGREEMENT

I have agreed to transcribe audiotapes of interviews for the research project *Judgements during Information Seeking*.. This project is being conducted by Jennifer Berryman, who is an enrolled student in a PhD program at the University of Technology, Sydney. The principal supervisor is Dr Theresa Anderson.

I agree to the following undertakings and conditions of ethical research practice as they relate to transcribing audiotapes of interviews with Jennifer Berryman:

4. I undertake to protect the privacy of those people whose records of interview I am transcribing.
5. I undertake to use pseudonyms in the transcripts to identify people and organisations. Jennifer Berryman has devised these pseudonyms.
6. I undertake to maintain the confidentiality of the substance of the interviews.
7. I undertake to reveal the identities of the people and the organisations named in the audiotaped interviews only if required to do so by law.

I understand that the UTS Research Ethics Committee has approved these undertakings and conditions.

Signed by …… Date ……..

(Name) ……....

Witnessed by …… Date ……...

(Name) …….

Appendix Five: Interview Guides

Judgments during Information Seeking
Semi-Structured First Interview – for background context

Date		Place	
Time		Participants	*Initials only*

Introduction
Explain purpose of the interview, what will happen to data, how it will be used. No right answers, am interested in what you think.

I have gathered background on the organisation [and your division, if available] from annual report and website, so I know a little about the context of your work.

Questions

*About **the work***

Q1 In your own words, though, tell me about the work of your division or branch – what part does it play? How do you see it helping the organisation achieve its purpose?

*Questions about **role***

Q2 Tell me about your role as a policy/research worker, the tasks and goals of your work?
F/U Tell me about your role fits in with the work done by this work unit.
F/U How do you feel about your work? What's important to you about the work you do?

*Questions about **tasks***

Q3 Tell me about the research project you're currently working on? How did it start? What you've been doing, how you've gone about it.

Ending the interview
Thank them.

1. *What should I have asked you that I didn't ask?*
2. *Talk to them about the second interview and its purpose – to focus on the final stages of a project*
3. *Ask questions from second interview.*

Judgments during Information Seeking
Semi-structured Second Interview – about judging enough information

Date		Place	
Time		Participants	*Initials only*

Clarify any points arising from the first interview.

Questions

Getting started

Q1 Please briefly summarise the piece of research work we'll be talking about.

F/U: What was the experience like – of looking for the information you needed?
F/U: How did you feel as you went about looking for the information? What do you think worked well for you? What didn't go well?

Questions about judging enough information

Q2 What were your feelings as you started looking for the information?
When you were in the middle?
Towards the end?

F/U What parts of the information seeking did you find easier? More challenging?

Q3 Tell us about the conclusion of this research work. What happened?

F/U How did you feel as you reached this conclusion?

Q4 How did you know you'd finished looking for information? How did you know it was 'appropriate' to stop? How did you make the call that you had enough information? What does *enough information* mean to you?

Q5 What did you find difficult about making this assessment to end to research process?

F/U What would you do differently next time? What have you learnt from this experience?

F/U Were there times when you just kept going? Sought extensions to deadlines, felt you really didn't have enough? What did you do? How did you feel?

Questions about influences

Q6 You talked about x and y, as you decided to stop looking for more information. What sort of things were in your mind as you made these decisions/assessments

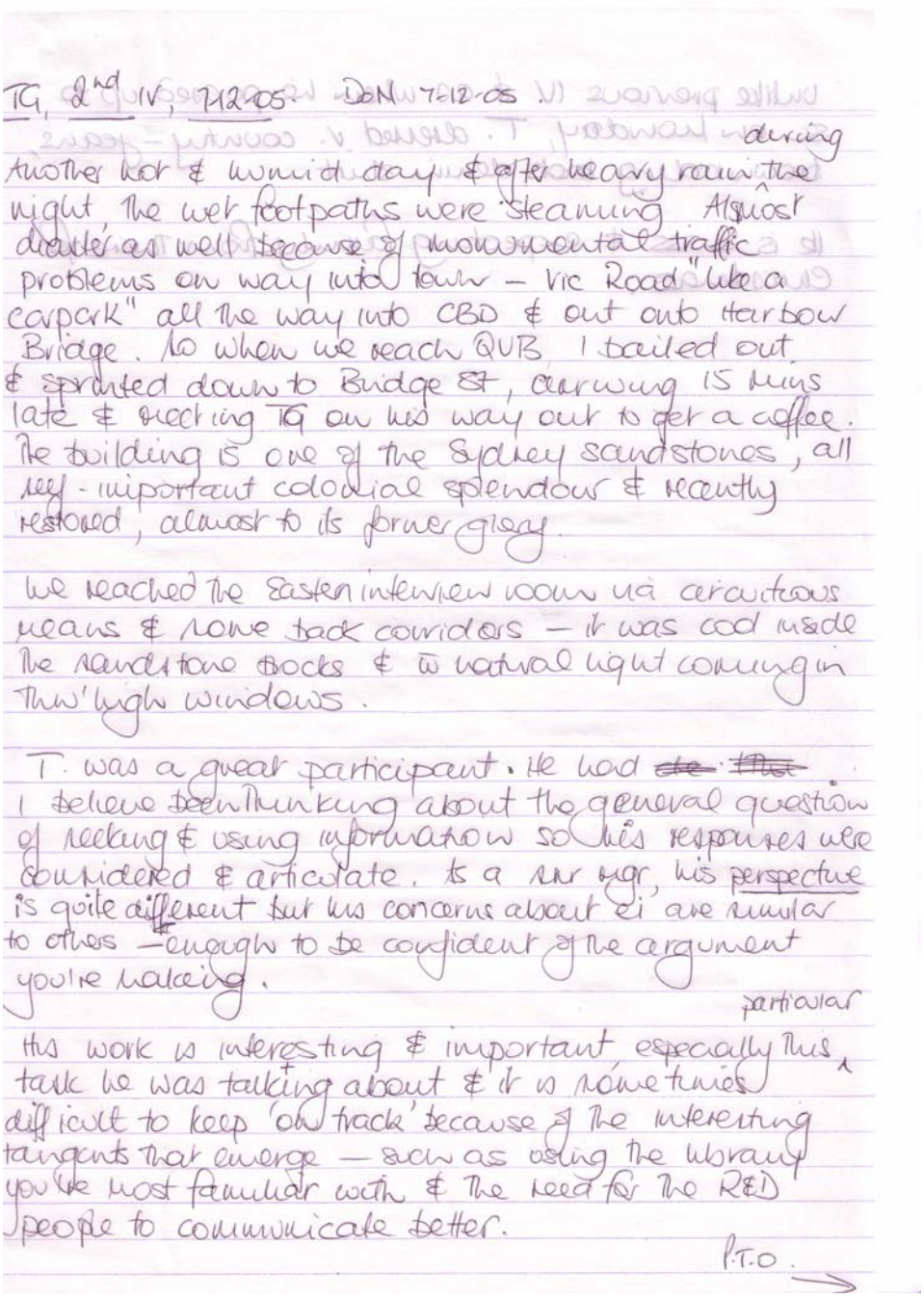
F/U – Thinking about your information gathering, what sorts of things were you aware of as you carried out the information gathering?

Ending the interview

Thank them.
What should I have asked you that I didn't ask?

Appendix Six: Examples of Analytic Work

6.1 Impressionistic Notes of the Interview (Case15)



TG, 2nd IV, 7.12.05. DoN 7-12-05

another hot & humid day & after heavy rain the night, the wet footpaths were steaming. Almost during deserted as well because of environmental traffic problems on way into town – Vic Road "like a carpark" all the way into CBD & out onto Harbour Bridge. No when we reach QVB I bailed out & sprinted down to Bridge St, arriving 15 mins late & meeting TG on his way out to get a coffee. The building is one of the Sydney sandstones, all very important colonial splendour & recently restored, almost to its former glory.

We reached the Eastern interview room via circuitous means & some back corridors – it was cool inside the sandstone blocks & w natural light coming in thru' high windows.

T. was a great participant. He had ~~the~~ ~~that~~ I believe been thinking about the general question of seeking & using information so his responses were considered & articulate. As a senior mgr, his perspective is quite different but his concerns about ei are similar to others – enough to be confident of the argument you're making.

particular

His work is interesting & important especially this task he was talking about & it is sometimes difficult to keep 'on track' because of the interesting tangents that emerge – such as using the library you're most familiar with & the need for the R&D people to communicate better.

P.T.O. →

6.2 Cross case analysis

Case (Participant)	How enough determined?
1 (Clare)	Answer the question – essentially, she asked herself: *'have I answered the question'* while acknowledging that the questions she is answering are implicit. (1) Issues as targets – C likened the experience of writing the Ministerial briefing to *'writing an essay for uni […] you say, what's the guts of this, why have they asked this?'* (1)
2 (Alan)	Time as a constraint (G) – A is pragmatic re how much information is enough – *'there's no point in coming in with something three weeks late'* – he is aware that some of the briefings are less than perfect – *'some of them, you think, 'gee […] a bit more time would have helped'* (2) Issues as targets – A sought to put together a brief which met needs, although recognising that what meets those needs (G), *'it varies, it varies'* – *'there might be two or three critical issues that you think you need to cover'* – sometimes *'they actually mention it or put it in an e.g. and so you think, 'oh, we'd better make sure we mention that''* (2) Enough is when it's signed off (G) – A felt he could say he had enough information *'when it's signed off'* (2) Not enough (G) A felt that the less good briefings are those with instances *'where you find something a few days later and you think, 'gee, it would have been nice to have known about that when you were doing the briefing last week''* (2) Gut feeling (G) – A felt is was a subjective assessment - *'you have to make a judgement call on how much information they want'* (2)
3 (PL)	Defensible position – P felt he needed *'this fairly rigorous level of research to demonstrate that you've been through the options and you've picked the right option, or the cost effective option'* – *'whether you can argue the case strong enough'* (3) Answer the questions – P knew that when a collaborating colleague had stopped asking him questions about the colleague's part of the paper, he (P) had gathered enough information – *'I knew when to stop when he'd stopped asking me for more information'* (3) Defensible position – P thought through and anticipated the reception the paper was likely to receive and wanted to be sure he had addressed the issues the various audiences were likely to raise – *'I guess trying to see how your proposal is going to be received by those people'* and, *'if you don't get a reaction from people, you're probably not doing enough'* (3)

Comment: ITS' TRICKY TO BE SURE THEY'RE TALKING ABOUT ENOUGH INFORMATION – OR ENOUGH WORK EFFORT TO DO SOEMTHING REASONABLE

Comment: Is it at this point that you're confident you have provided something fit for purpose, have been accurate in your sit awareness and the MM is ok

Comment: Note that P (and indeed you too) have equated stopping with enough

6.3 Matrix: Time ordered experience of the critical incident tasks

Task Type	Case	Time 1 (task assignment)	Time 2 (working on task)	Time 3 (task product deemed to have enough information for completion)
Policy	9	This policy development task was "different" (IV 15, L 499) in that there "wasn't really any timeframe" (IV 15, L 499) – Cath had to create her own timeframe.	Once she had a reasonable draft for internal consultation, she sent it to regional offices and branches for comment re "what wasn't clear" (IV 15, L 422) and "what needed to have more information in it" (IV 15, L 423).	Given what happened to the policy in the end, Cath felt she could have taken 3 years, if she'd wanted to – since "there doesn't seem to be any urgency about getting it done now" (IV 15, L 508)
Policy	9	As she spoke to people, she was able to work out a "bit of a structure for myself" (IV 15, L 209/210). As this happened, the information gathering and the task became "more satisfying" (IV 15, L 218) because she felt she knew what she was doing and where she was going and she could see it was "achievable" (IV 15, 223). This was important for Cath because when she started off with "this vague thing" (IV 15, L 224) she had no idea if it was indeed achievable.	Cath likes to "give it to other people to look at" (IV 15, L 432) as a way of surfacing any assumptions she may not be aware of.	She read the drafts herself with a view to identifying anything someone else "could possibly object to" (IV 15, L 401), using that as a signal that she would need to "have enough information to answer them" (IV 15, L 402)
Data Report	10	He expected the task to be easy and straightforward – that someone would have already solved the mystery and he would just have to remind them. After a few days, he realised "it's serious business we're talking about" (IV 14, L 510/11).	Although working primarily with quantitative data sets, he needed to use other types of information that would help explain why the numbers were what they were.	He felt his experience helped him a great deal in assessing when he had enough information.
Data model	16	The task/project he was involved in was seen by all as a long journey and they (the senior staff and politicians) acknowledged that they were only just starting out. Ron saw it as 'an ongoing process to fill in the data gaps' (IV 33, L 435)	He 'hunted down' (IV 33, L 447) as much information as he could in the time available and then had to assess if that information was 'fit for purpose' (IV 33, L448), asking himself 'does it meet the needs, or can it be adapted to' (IV 33, L 448/9).	Ron used the passage of time as a signal that his information seeking was at an end. He set himself the task, planned the steps, including gathering information and allocated time and resources to it. So he had a time in mind when he would be at the end of the task. However, when he reached that point, he had to assess if he had enough information to 'achieve the outcome I was looking for' (IV 33, L 426)

6.4 Matrix: Assigned or self-initiated tasks

Case No	Assigned (A) Or Self Initiated (SI)	Task type	Themes around J/EI
1	A	briefing paper	Feedback; Frameworks; Physical product; Puzzle pieces; Scanning; Timeframe
2	A	briefing paper	Feedback, Fluid; Frameworks; Intuition; Not enough; Physical product; Puzzle pieces; Scanning; Timeframe
4	A	briefing paper	Confidence; Feedback; Framework; Intuition; Iterative; Not enough; Physical product
20	A	Briefing paper	Feedback; Intuition; Iterative; Model; Not enough; Timeframe; Cost benefit
5	A	chapter	Fluid; Framework; Iterative; Physical product; Timeframe
19	SI	Discussion paper	Experience; Feedback; Framework; Iterative; Model; More than enough; Not enough; Physical size; Timeframe
11	SI	Literature review report	Feedback; Fluid; Framework; Not enough; Puzzle pieces; Redundancy; timeframe

6.5 IUE Analysis Sheet

Case No	Code [a]	Notes
17 [b]	Pm	Used supervisor to find out exactly what was required. Initial info seeking was f2f with industry group – used reports and articles, also policies in place in other jurisdictions. Interviewed range of stakeholders.
17	Ps	Was aware he needed to know how other affected Govt agencies viewed possible policy interventions. His unit is "crucial link" (IV25, L109) between other sections in the department. He coordinates responses using information provided by other parts of the department.
17	PRs	He deals with range of problems, some requiring a one page response, others such as task much more detailed. "incremental change" (IV25, L201) is what it's all about. But his supervisors weren't able or willing to articulate what they wanted from him. Much work had already been done but none of it used.
17	Ssu	Highly bureaucratic – "layer upon layer" (IV25, L525) that signoffs had to go through. This department also result of merger of several others. Now have a gamekeeper poacher role but it works because issues resolved within the family.
17	Sd	Has some experience in area but is not an expert.
17	Sai	Biggest lesson in first 9 months was who to go to to get info. Most of it is in people's head. Had no problem finding information – challenge was how to fit into the scheme of things, making sense of it.
17	PSiu	They negotatied outcomes that sought to satisfy as many stakeholders as possible – very cyclical, iterative process. When he presented back to industry, he wasn't permitted to give them all the info he had – he wasn't allowed to use the words he had used – it was about managing meaning and expectations. R felt you cannot resolve policy issues (unlike number crunching) – you get a small win today, and another small win in a couple of years time.

a Pm: People – media use; Ps: People – social networks; PRs: Problem – structured or not; Ssu: Setting – org structure; Sd: Setting – domain; Sai: Setting – access to info; PSiu: Problem resolution – info use.
[b] Task Type: Development of draft strategic policy

6.6 IUE Analysis Sheet: Using information to resolve problems

Information Uses	
In the theoretical IUE	In the study
Problem understanding	- Familiarise themselves with an unknown domain and make sense of the problem - Assess stakeholder views on the problem
Enlightenment	- Discover existing or previous positions taken on the problem - Keep up to date with emerging problems and the progress of the current problem
Projective	- Assess stakeholder views on proposed solution
Factual	- Gather the raw material they needed - Gather authoritative evidence
Confirmational	- Feedback on the work they were contributing towards the resolution of the problem

Figure 6.3 VF's assessment and reassessment of enough information

Lack of clarity about nature of the task	VF's task was to prepare a submission in response to another public sector department's decisions about young drivers. Among other responsibilities, this department regulated traffic rules for the state. The department had announced it was reviewing guidelines for young drivers and planned to bring in reforms aiming to improve safety for this group. Vita and her colleagues could see the proposed changes would be detrimental to the wellbeing of young people and decided to prepare a response At the outset, there was confusion about exactly what Vita's organisation was supposed to be doing. Vita's team was unsure whether they should respond immediately to the department's announcement or wait to see if a discussion paper was released. The department then announced changes to the review process, indicating the process would commence with a consultation period. As part of this consultation process, the department released a discussion paper and Vita was given the task of preparing the organisation's formal response to the discussion paper. However until the department released the discussion paper, Vita was unable to start work on gathering information since she was unsure exactly what issues she would need to address in her response. This situation was a source of uncertainty and frustration. Further, because she knew little about road safety issues and her initial searches had found a substantial body of literature, Vita felt overwhelmed by the task she had been assigned.	
	VF initially sought out the Young People's Reference Group, a standing group used by her organisation to provide guidance. She set up and facilitated focus groups with representatives of the age groups suggested by the Reference Group and, at the same time, commissioned the organisation's information manager to carry out database searches around topics and search terms she provided. Vita carried out her own desk research, sourcing and reviewing the references in the discussion paper released by the Department and using the web to source policy material from overseas and interstate jurisdictions. Vita was overwhelmed by the amount of information available, so for her, one challenge was making something useful out of it: 'how do I make that into anything that could possibly be a real policy?' (IV21, L552/3). Vita worked her way through the material and brought it under control by using as reference points the viewpoints of the young people interviewed. Once she had a clearer idea of what she was after, the gathering of the information was straightforward.	*Using stake-holder views to shape initial mental template*
Reference points help shape template	Although Vita was the only person working directly on the submission, she worked collaboratively, relying on advice from colleagues and supervisors, 'grabbing anyone around' to use as a sounding board (IV21, L246). She relied on both colleagues and the Reference Group members to give her different points of view, which she found 'just kind of help you to clarify in your mind' (IV21, L254) which issues needed priority and which were less significant. The shifting and ill-defined goals towards which Vita worked were typified in a dilemma she had faced several times in the past. The literature and research findings would flag an issue as important or indicate that a solution worked. However, when Vita interviewed young people, she found they didn't see the topic as an issue or the solution as workable. Then she has to go back to 'to fill in those gaps' (IV21, L301), talking again to the	*Views of stakeholders shape mental templates*

Iterative process of updating the mental template	Young People's Reference Group, to the research participants or even commissioning a new group of participants. In this case, Vita found it especially difficult to deal with the dilemma. The young interviewees advised they did not want a certain proposal to be brought in by the Government. However, Vita knew from research findings that this response was effective in reducing death and injury in road accidents, and found herself thinking 'which way do you go?' (IV19, L413). This dilemma necessitated 'a trip back' (IV21, L322) to seek more input from young people, and in the end, she included both the research and the young people's views on the issue. VF did not really know if she had enough information until she started writing up the submission. This was a common experience for her, when a lack of flow in the written report can suggest that something is missing. At this stage, for a second time, Vita drew on her colleagues to give her feedback about whether or not she had missed something crucial. VF found the timeframes within which she had to work caused her stress. In the case of guidelines for young drivers, she found herself getting close to the deadline but still 'going back and forth with changes a lot' (IV21, L401). Adding to the stress in this instance, a new issue surfaced in the media when Vita had almost finished the submission. It was an issue 'we hadn't really talked about' (IV21, L403/4), so she had to go back and make sure she covered this new concern. Vita she was aware that this submission responding to proposed changes to guidelines for young drivers had the potential to save lives. Vita felt 'torn' (IV19, L407) when she looked at newspaper reports about 'some young person who had died' (IV19, L409), knowing that had some recommended changes already been in place, for example, a curfew on young drivers, then that death might not have occurred. Vita was relieved to get the submission written and off her desk and felt pleased that '… it's actually coming together. I never though it would' (IV 21, L360/1	*What constitutes enough information is fluid*

Note. Vignette from case 13.

Figure 6.4: The influence of supervisor and stakeholders

	Fiona's critical incident task was the preparation of a discussion paper. The discussion paper was one part of a project to develop and present a piece of new legislation. When working in areas in which she had some experience, Fiona usually felt that she had an *"inkling"* (IV 27, L329), some *"broader schemata"* within which to begin work. In this case, however, Fiona felt she had started with *"blank sheets"* (IV 27, L111/2). Fiona started her information seeking by doing a broad scan – finding *"all sorts of bits and pieces that had to be sort of put together"* (IV 27, L 39-40). In doing this early information seeking, Fiona's manager helped her by giving her perspectives on the task and by explaining task requirements. But Fiona still felt at the beginning: *"which bit of string do you start with?"* (IV 26, no lines). As she began to unravel the ball of string, Fiona began to see her way forward. Fiona was dealing with a variety of stakeholders with different concerns – and would head off in one direction, only to find after she had got the briefing paper done, that no, that wasn't going to work. She found herself working in a context in which *"events were moving so fast that things kept overtaking things"* (IV27B, L62/3) and was *"working so fast and the goalposts were moving at such a rapid rate"* (IV 27, L132/3). As she worked through the information gathering and putting together the paper, there was a lot of *"refining"* and *"sharpening"*, and reaching the conclusion that yes, *"that meets the issue, that gives us an answer we can use"* (IV 27B, L 29/30). As she worked through the task and the information gathering, Fiona felt they were *"layering, were building up this understanding"* (IV 26, no lines). She experienced the information gathering as *"that constant backward and forwarding"* (IV 26, no lines). Fiona had to look at the issues form the perspectives of all the different stakeholders and anticipate how they would react, and aim to manage that reaction and there was a lot of working backwards and working with other organisations: *'The policy issues I suppose were really, we ultimately needed the Minister's or the Premier's approval and central agencies [...]and with that, that sorted it'* (IV27, L18-20) Fiona felt she was aiming for something *"workmanlike"* which would *"address the issues [...] have an argument that works* [...] *that's the main thing"* (IV 27, L 343/4). Other agencies also played a role in helping assess when Fiona had enough information. When associates in the other organisations provided feedback, advising *"yep, yep, yep, that'll work"* (IV 27, L 188), Fiona's confidence that she had enough information increased.	*Views of her supervisor help shape mental template* *Views of stakeholders help signal that enough information has been gathered*
Views of stakeholders shape what constitutes enough information		

Note. Vignette from case 18.

Figure 6.5 Drawing on experience in judging enough information

	TG was a senior manager in what had been until recently a super-department. Tim had worked in the department, in its various guides, for 14 years, although had only been in his present position for three months. Tim acknowledged that 'Nothing I do ... nothing I do lives right up there in that sort of highly likely and catastrophic [risk]. Kids don't die, you know, planes don't fall out of the sky with what I do' (IV 24, L 494-496). The risks that Tim needs to manage are to with 'political fall out' (IV 24, L 497). The critical incident task Tim discussed was part of a larger project. This project was a regulatory review, a project which follows a standard course. Within the standard process, a discussion paper is prepared and released for both stakeholder and general community comment. The critical incident task was the preparation of this discussion paper. Having prepared this kind of discussion paper before on other topics Tim felt the process of preparing the discussion paper would be straightforward and for this reason, he devolved responsibility for the information seeking and writing up of the paper to one of his team members. Although the team member did the information gathering and the writing up, Tim had responsibility for the final decision to release the paper for public scrutiny. In making the judgement that enough information had been gathered, Tim also drew on members of an Expert Reference Group, brought together because of their knowledge and experience in the field. TG's 'initial sort of trawl' (IV 24, L 74) for information drew on the knowledge of departmental staff, information and advice from industry representatives and the media, the latter source used as a way of gauging community concerns. After surfacing key problems from these three sources, the team member carried out a formal literature review. Tim himself also did some literature review work, in what he described as a 'relatively mechanical' (IV 24, L201) process. When reviewing the draft paper for the first time, Tim decided it was almost there. However, on one point, he felt there was not enough information and asked the team member to 'go away and do some more work on this' (IV 24, L 327/8). When pressed for the clues he used in making this judgement, Tim responded that he drew on a combination of his experience and his 'own reading of the tea leaves' (IV 24, L 336-7) to guide him on what was important and the breadth and depth of the coverage needed. He felt he was 'sensitive' (IV 24, L 339) to what might cause problems – he used his 'radar' (IV 24, L 340), explicitly acknowledging that this approach was not 'scientific at all' (IV 24, L 340). Towards the end of work on the task, Tim felt it would be 'fairly smooth sailing' (IV 24, L 238) as he and the team member had covered the key points. Several points had 'some controversy around them' (IV 24, L 240) but Tim was confident that he could manage those potential controversies because he had the arguments in place to support his position. The lack of a scientific approach was also reflected in TG's description on recognising that enough	*Experience helps with the initial development of the mental template of task and information needed* *Experience helps in the iterative assessments of enough information* *Experience increases TG's confidence that he has enough information to cover points in the argument*

	information had been gathered and used in the discussion paper: 'We knew it when ... we knew it more by gut than by, you know, having exhausted [sources]' (IV 24, L 320/1). However, before the paper went out to the public, Tim ran it past the Expert Reference Group 'to sort of check again' (IV 24, L 345) that he had a solid position and that nothing was missing, a kind of 'litmus test' (IV24, L347) for the judgement of enough information. TG also acknowledged the importance of timing as much as having a solid argument based on solid information. 'Timing is everything' (IV 24, L 533). 'If the timing is right and there's an intuitive perception of an problem, that is common, then you can often run off very little information and get a result. If the timing is wrong, you could have War and Peace, and it'll go nowhere. It won't matter, if the timing is wrong' (IV 24, L 541-545).	

Note. Vignette from Case 15.

Figure 6.6 Pragmatic approach to the risk of not enough information

Layers of decision making (which contributed to sense of shared responsibility)	Gabi worked in the strategic policy and planning branch of a large department where she develops new policy and analyses and evaluates existing policy. The critical incident task discussed by Gabi was the preparation of a briefing paper for an incoming Minister of the state. The paper was one part of a major project to develop and implement the Department's strategic policy on managing anti social behaviour in housing estates. Gabi described the project itself as a *'moveable feast'* (IV 31, L 312), with changes in Ministers bringing different views on what should or could be done, so changing the parameters within which they were working. Gabi felt the signal that she had finished her information seeking was *'deadline-based'* (IV31, L 327) in that she worked back from the deadline for the final product to leave her desk, allowing time to write and revise the paper. Despite being used as a signal, Gabi noted that the deadlines were often *'artificial'* (IV 31, L451). Since the document would have to go through layers of signoff, she feels the situation is one of three weeks to get the approvals needed and two days to actually research and write the paper. Generally, Gabi finds judging *enough information* is 'really difficult' (IV 31, L 348). She gathers information from a range of sources until *'I feel like I've got a pretty comprehensive picture'* (IV31, L 354) on a range of issues. Then she says: *'Ok, that's all I can do'* (IV 31, L 355) and she moves on to the next stage of the task. In this instance Gabi sought to put together a balanced coverage of the issue, looking for positive and negative views, particularly mindful of her personal attitude towards the proposal being canvassed. She was conscious that there was more information she could have looked at but she decided not to pursue it. As she moved towards the deadline and completing the paper, Gabi felt relief that it was coming to an end – but she was also anxious: *'But at some point you have to let go, and go, I've done, you know, what I can do in the time'* (IV 31, L 405/6). Gabi was conscious of the risk that she might have missed something as she determined that she had got to the end of information seeking and should start putting her paper together. She felt she had enough information when she was able to make sense of the issue and how she was representing it in the paper	*Pragmatic approach to the risk of missing information* *Pragmatic approach to risk of not having enough information*

Note. Vignette from case 20.

Appendix Seven: Audit Trail

Audit Trail Class.	File Types	Evidence & Comments
(1) Raw data	(A2) [a] – audio tapes and transcripts	(A2) Tapes – held in filing cabinet (A2) Interview transcripts – hard copy master in Masters file; hard working copies in case folders; e-copies password protected in Empirical Research subfolder.
	(B1) – interview records	(B1) Field notes, impressionistic summaries after interviews – hard copy only; held in case folders
	(C1) – public documents	(C1) Excerpts from reports and submissions about the agencies and the tasks; position descriptions for policy and research officers in NSW public sector.
(2) Data reduction and analysis	(A) writeups of field notes	(A) Case summaries as written-up vignettes (e-copies by case in Analysis and Findings/Data Analysis/Cases subfolder – Narrative Writeups)
	(B1) summaries – condensed notes on events, behaviours	(B1) Tally sheets and matrices on length of participant experience, type of task,
	(B2) units of information – themes, behaviours, ideas, concerns	(B2) Transcripts with units of information identified by broad groups (hard copy in case folders) (B2) Units of information segmented by broad categories (e-copies in All Categories.doc; also hard working copy in Case Comparisons folder)
	(C) - theoretical notes – working hypotheses, concepts, hunches	(B2) Units of information cut, separated and grouped by category (hard copy in Case Folder) (B2) Summaries of units of information about how *enough* assessment made (e-copies by case in Analysis and Findings/Data Analysis/Cases subfolder) (B2) List of categories used in initial pass (e-copy, in Analysis and Findings subfolder) (C) Notes in research notebooks (flagged in the notebooks and typed up in Analysis and Findings subfolder.
(3) Data re-construction and synthesis	(A) categorical structure	(A) Broad groupings (e-copy and hard copy) (A) Cross case analysis of enough (e-copy in Data Analysis); IUE analyses (hard copy – filed in IUE Analysis folders).
	(B) findings and conclusions – interpretations, inferences	(B) Published articles (Information Research; Journal of Information Science) and presentations
	(C) final report – connections to existing literature – integration of concepts, relationships, interpretations	(c) Thesis

Audit Trail Class.	File Types	Evidence & Comments
(4) Process notes	(A) methodological notes	(A1) Research Plan; daily time sheets (hard copy); research notebooks (hard copy);
	(1) procedures	(A2) Written up in notes for Chapter 4 and in Research Plan
	(2) decisions	
	(3) strategies	(A2) Written up in notes for Chapter 4 and in notebooks.
	(4) rationale	(A2) History of interview guide development during interviewing period (e-copies of versions of IV guide in Full Study/Designing)
		(A4) Notes for chapter 4.
(4) Process notes, continued	(B) Trustworthiness notes	(B) – No member checks on advice of supervisors – thesis to be my work alone
	(1) credibility	no triangulation in data gathering possible – see chapter 4 notes.
	(2) dependability	
	(3) confirmability	Notes on rationale for use of two interviews and on gaining trust and confidence.
	(4) transferability	
	(C) audit trail notes	See this document. All planning, data gathering and analytic work is dated.
(5) Intentions and dis-position	(A) proposal	(A1) Thesis proposal (hard copy; e-copy in Process/Application subfolder)
	(1) goals, objectives, and inquiry questions	
	(2) intended methodology	(A2) As laid out in notes for chapters 2, 3.
	(3) relevant literature	
	(4) information on current theory	(A3) As laid out in notes and drafts for chapter 2.
		(B1) – as noted in Notebooks (hard copy only).
	(B) personal notes	
	(1) reflexive notes	(C1) – as noted in Notebooks (hard copy only)
	(2) motivation	
	(C) expectations	
	(1) predictions	
	(2) intentions	
(6) Instrument develop-ment	(A) pilot / preliminary schedule of questions	(A) history of interview guide development during interviewing period (e-copies of versions of IV guide in Full Study/Designing; also hard copies with working notes in Folder)
		See also detailed notes in Research Plan.doc

a Alpha-numerics refer to Lincoln and Guba, 1985, Appendix A

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