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Investigating the Generic Information-Seeking Function of Organisational Decision-Makers: Perspectives on Improving Organisational Information Systems

Sumedha M. Makewita

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Abstract

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By

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The past decade has seen the emergence of a new paradigm in the corporate world where organisations emphasised *connectivity* as a means of exposing decision-makers to wider resources of information within and outside the organisation. Many organisations followed the initiatives of enhancing infrastructures, manipulating cultural shifts and emphasising managerial commitment for creating pools and networks of knowledge. However, the concept of connectivity is not merely presenting people with the data, but more importantly, to create environments where people can seek information efficiently. This paradigm has therefore caused a shift in the function of information systems in organisations. They have to be now assessed in relation to how they underpin people's information-seeking activities within the context of their organisational environment.

This research project used interpretive research methods to investigate the nature of people's information-seeking activities at two culturally contrasting organisations.

Outcomes of this research project provide insights into phenomena associated with people's information-seeking function, and show how they depend on the organisational context that is defined partly by information systems. It suggests that information-seeking is not just searching for data. The inefficiencies inherent in both people and their environments can bring *opaqueness* into people's data, which they need to avoid or eliminate as part of seeking information. This seems to have made information-seeking a *two-tier process* consisting of a *primary process* of searching and interpreting data and an *auxiliary process* of avoiding and eliminating opaqueness in data. Based on this view, this research suggests that organisational information systems operate naturally as implicit *dual-mechanisms* to underpin the above two-tier process, and that improvements to information systems should concern maintaining the *balance* in these dual-mechanisms.

To my loving wife Himaly

for her love, encouragement and commitment,

and for being with me so closely,

sharing all the happiness and bitterness in life

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Chapter 1

Introduction

1.0 The Inspiration

In the summer of 1997 the researcher worked in the strategy department of the company XA. There he became a casual observer of the various means and strategies adopted by people to gain knowledge to perform their day-to-day tasks, and their patterns of interaction with the various sources of information. Information-seeking was seen as a process of successes and failures, which were not always the purposeful trial-and-error sequences. This organisation was in the forefront of using advanced information technology with sophisticated equipment allocated to each and every person. This equipment was linked to rich sources of data including both electronic databases and human beings. However, decision-makers of this organisation implied that they were suffering from inadequate information, and the researcher was amazed to notice the number of assumptions that people were compelled to make in order to progress through their daily tasks.

There were several questions that stimulated the researcher to undertake this research project. Fundamentally, how could this organisation be improved? Could information systems be changed so that they are compatible with natural human behaviours as they seek for information? However, as people are always associated with some sort of an information system, could there be a natural human behaviour that is independent of information systems they use? And if not, how do information-seeking activities depend on the information system itself?

This research project is, therefore, driven by the broad objective of improving organisational information systems to underpin people's information-seeking efforts. It is an investigation of how people behave in their information-seeking for decision-making tasks and how this behaviour depends on the organisational environment that

includes information systems. This research takes the stance that people's information-seeking behaviour is defined by the nature of their 'information-seeking function', and our understanding of this function might lead us to align information systems effectively with people's behaviour. We define the information-seeking function as compassed of the *beliefs, motivations, actions and their interrelations* that lead people within some contextual setting to seek and fulfil information needs (see section 1.2). The nature of this function therefore depends on both people and their environment. Hence, this research project is an investigation of people's information-seeking function within the complexities of the organisational context that is defined partly by information systems, so in turn we understand how the information systems can be improved to underpin this function.

This dissertation presents a descriptive theory that emerged from an interpretive research study carried out at two culturally contrasting organisations, one of which is the company XA that was mentioned above. The study inquired through in-depth interviews into the information-seeking activities of people in their decision-making tasks. This interview data were analysed using Grounded Theory techniques (Glaser and Strauss, 1967; Strauss and Corbin, 1998) to expose specific phenomena associated with information-seeking and their relationships with the organisational context. Outcomes of this research provide a newer perspective on people's information-seeking function, and from which implications are drawn for improving organisational information systems.

This introductory chapter suggests that there is a need for further research in this particular area of study. Section 1.1 describes the importance of understanding people's information-seeking function within the context of the organisation and its information systems. Section 1.2 describes the focus of this project. It defines the information-seeking function, and investigates the scope of existing theoretical perspectives in describing this function. Based on these, section 1.3 states the objectives of this research project. Section 1.4 outlines the approach taken in this research study, which is followed by an introduction to the remainder of this dissertation.

1.1 Changing Perspectives of Organisational Information Systems and the Importance of Understanding the Information-Seeking Function

Information systems were seen in early periods as rule-based rigid systems designed to provide information to people to perform their tasks. Their function may be said to have been governed by the question 'what information should be provided?'. This perspective however changed subsequently into seeing information systems as people-centred social systems. This change highlighted a newer perspective in the function of providing information in that it is governed not only by the question 'what information?', but additionally by the question 'how to provide this information?'. Research has pointed out that not all data can be provided objectively because of ambiguities in decision situations (e.g. Daft and Lengel, 1986; Weick, 1979; Mintzberg et al., 1976), and also that human cognitive processes are contingent on many factors so that it is difficult to provide 'perfect data' (e.g. Hastie and Pennington, 1995; Payne et al., 1995; Churchman and Schanblatt, 1965). Significantly for this thesis, the emphasis of information systems development has therefore not only been on the *presentation of data objectively* but also on the facilitation of *subjective search* by decision-makers. This perspective has highlighted the importance of understanding the nature of people's information-seeking function within the context of decision-making and the organisational environment.

The 1990s can be seen as a third era in the development of information systems. This can be marked by the establishment of the view that organisations are bodies of knowledge and the natures of businesses are in a state of transformation from being resource-led into becoming knowledge-led. This new paradigm introduced newer perspectives into strategic thinking processes so that organisations became concerned about how to develop and exploit 'organisational knowledge'. This was reflected in the function of information systems where the emphasis was on *connectivity* to create pools and networks of knowledge. Connectivity means interlinking information resources, including people, so that people have access to a wider knowledge base from which they can gain knowledge, and also to which they can contribute. Connectivity therefore emphasised not only infrastructure enhancements, but also cultural shifts and establishments of newer norms where people's attitudes and behaviours towards sharing knowledge were key concerns (e.g. Sarvary, 1999; Zack,

1999; Davis and Meyer, 1998; Davenport, 1997; Demarest, 1997; Spender, 1996; Teece, 1992; Prahalad and Hamel, 1990)

In the past two decades, many researchers have tried to resolve the ambiguities relating to the concept of organisational knowledge, and in particular to define the 'organisational knowledge base' (e.g. Hackbarth and Grover, 1999; Johanessen et al., 1999; Spender, 1996; Kim, 1993; Nelson and Winter, 1982). In this process, they have exposed the complexity of the knowledge base that is available to individual decision-makers in organisations. Here we adopt the simple model suggested by Spender (1996) to show how complex may be a person's accessible knowledge base that may be created through connectivity (Figure 1.1). Here we have emphasised the fact that a person's knowledge requirements often cross the boundaries of the organisation, and therefore the scope of connectivity is not confined to the organisation alone.

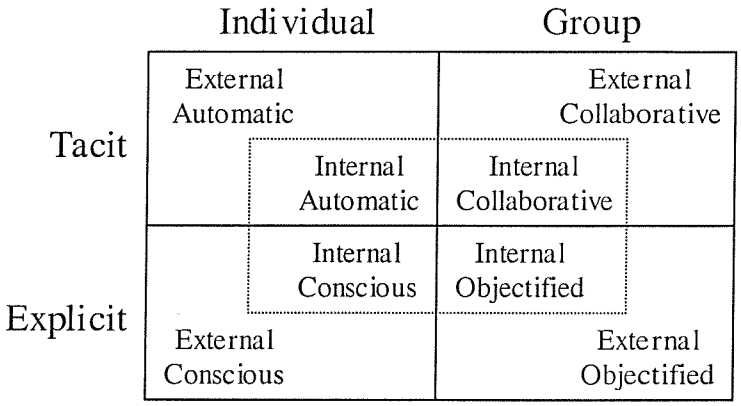

Figure 1.1 – The Nature of the Knowledge Base Available to the Decision-maker
Adopted from Spender (1996)

This model shows importantly that a person's knowledge resources are not confined to what can be communicated explicitly, which leads us to think of connectivity as a concept that is broader than just communication networks. However, organisations may have found these theoretical arguments have limitations when trying to create connectivity within practical circumstances. Organisations are characterised by their culture, size, bureaucracy, infrastructure etc., and therefore creating theoretically-viable channels to achieve connectivity is constrained by these contextual factors. Some organisations operated within these constraints and tried to exploit paths on a

limited basis, while other organisations challenged their realities and emphasised transforming into more flexible states that underpinned connectivity (e.g. Sarvary, 1999; Davenport and Prusak, 1998; Davenport, 1997).

Hence, what ought to be noticed regarding connectivity is that it is not simply presenting data to people. Instead, this paradigm seems to have the following aspects:

- Connectivity creates a proactive information environment for people, which constantly alerts them to changing circumstances in their immediate and macro environment, and therefore people are motivated to seek information and become better decision-makers. Hence,
- Connectivity ought to create information systems environments that facilitate efficient information-seeking for decision-makers.

Consequently, there has been an important change in the function of information systems where the question of 'what information?' may be seen as something to be resolved by people more than by information systems. The function of information systems may now be seen as governed by questions: *'how to expose as much knowledge as possible?'* and *'how to help people in their process of selection?'*.

Hence, the effectiveness of information systems in the context of connectivity has to be evaluated through how they underpin people's *generic information-seeking function*. But this function might in turn depend on the information systems of the organisation. Therefore, we suggest that the information systems of an organisation have to be evaluated through a context-based description of the nature of people's generic information-seeking function when this context itself is defined partly by information systems.

Hence, there is a need for a *theoretical perspective* of the generic information-seeking function, which identifies the phenomena associated with people's information-seeking and their relationships with the organisational context.

1.2 Focus of this Research

This section describes the focus of this research project by taking into account both the *need for a theoretical perspective* as it was highlighted in the previous section, and the *scope of existing theoretical perspectives* from research literature, which then leads to defining the specific research objectives in the next section. Firstly, it is important to present a detailed view of information-seeking, and particularly to describe what is meant by 'information-seeking function'.

1.2.1 Information-Seeking and Information-Seeking Function

a) What is Information-Seeking?

Information-seeking is defined broadly in research literature. Johnson (1996) suggested that it is the *purposive acquisition of information from selected information carriers*. We may see it as a *set of activities led by motivations* through which people fulfil their specific information needs. As such, information-seeking may be seen as having two main elements: (1) motivation to seek information, and (2) actions of seeking information. These may be seen as interrelated where the motivation influencing actions, and in turn actions influencing the motivation.

Firstly, the motivation to seek information may be understood by raising the question 'why people seek information?'. We may provide a broad answer to this by suggesting that people seek information because they need to make decisions, or justify the decisions they have already made. It follows the view that people sail through their daily lives by making decisions about everything they encounter. These decisions may be personal, family-related or work-related, and people need to constantly create and update mental situation models for which they seek information (Hastie and Pennington, 1995). However, research has shown that motivation is influenced further by contextual and personality factors. It means that, although decision-making is the primary concern, people's motivation to seek information depends on their beliefs, which may be differentiated by contextual and personal factors (Johnson, 1996).

Secondly, actions of information-seeking may be understood by raising the question 'how people seek information?'. An answer to this may be suggested through what is observed explicitly in our environment, where people are seen in constant interaction with *information carriers* to acquire data, which they transform into information and ultimately into knowledge that underpins their judgements. Actions can therefore be characterised by people's reasons for selecting particular information carriers, and also by the manner in which they use those selected carriers.

Thus, information-seeking is a concept that encompasses the interrelated beliefs, motivations, and actions that lead people to fulfil their specific information needs.

b) What is Information-Seeking Function?

The *information-seeking function* may now be defined by confining the concept of information-seeking into a specific *contextual and personality setting*. It means that, while information-seeking has been a broad concept, the information-seeking function always refers to a particular person or a group of people within some specific contextual setting. For example, we may think of the information-seeking function of a senior manager in a commercial organisation, that of a lecturer in a university environment or that of the employees in a public sector organisation. The differences between their beliefs, motivations and actions of information-seeking may be attributed to their environmental and personal differences.

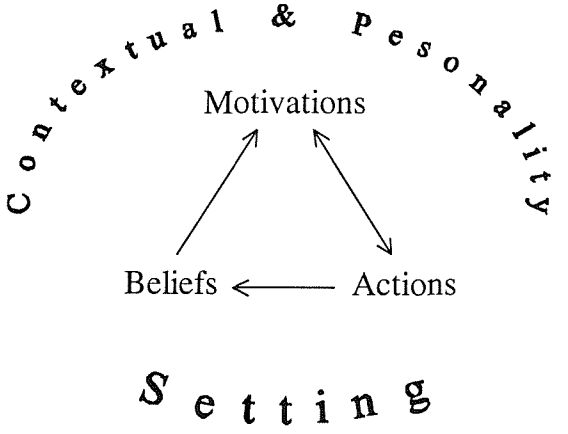

Figure 1.2 – Information-Seeking Function

Thus, although the concept of information-seeking can be described broadly, the information-seeking function needs to be described with reference to those parameters that are significant in differentiating one contextual and personality setting from another. For example, the officials in a public library would describe this function with respect to the social, cultural, economic and infrastructure setting of their locality, and with a broad definition of personality factors. In contrast, the officials in a university library would describe it with respect to much more confined parameters.

This research project is focused specifically on people in commercial organisations. And, importantly, it aims to look at people's information-seeking function from an *information systems perspective*, which is different from the majority of research in this arena. Research has mainly come from the field of information science, which seems to carry a macro perspective on the whole issue of information-seeking. In contrast, our aim is to understand the state of information systems in organisations as an effective environment that supports people's information-seeking function, and in turn to understand how information systems can be improved in the same context. However, the complexity of this issue resides in our preliminary premise that information-seeking is context-dependent, and that information systems are part of this context. And, therefore the information-seeking function has to be described partly in relation to the information systems in people's environment.

1.2.2 Paradigm for Investigation

Prior to defining any specific research objectives, we may raise two questions regarding our knowledge about information-seeking: (I) Firstly, how much do we know about information-seeking? (2) Secondly, how much do we need to know if we have to evaluate organisational information systems in the context of connectivity? However, before suggesting answers to these, it is important to establish our basic beliefs about knowledge, or the *paradigm* upon which the research objectives ought to be built on:

- Our paradigm could be that the phenomena associated with information-seeking function reside in people's conscious knowledge, and these are revealed through people's explicit behaviours and conscious descriptions.

- Alternatively, our paradigm could be that the information-seeking function is defined by implicit broader phenomena that extend beyond people's conscious understanding. In this case, we ought to *free ourselves and think broad* about people's explicit behaviours and conscious descriptions, and ask the question *'what broader phenomena they may be referring to'*.

Thus, establishing the appropriate paradigm is fundamental to stating research objectives, but prior to settling on the paradigm, it is important to establish the scope and the nature of existing theoretical perspectives from research literature.

1.2.3 The Scope of Existing Theoretical Perspectives

Research in this arena can be categorised into two main strands. One category has been pursued mainly in the field of psychology. It has aimed to understand how human cognitive and information processing systems work to make judgements about life events from various stimuli that one can encounter (e.g. Maule and Edland, 1997; Hastie and Pennington, 1995; Payne et al., 1995; Stiensmeier-Pelster and Schurmann, 1993; Kaplan et al., 1993; Huysmans, 1970; Churchman and Schanblatt, 1965). This research has studied phenomena exclusively through laboratory-based experimental research. As these phenomena cannot be studied effectively through field research, the resulting theories have limitations for a context-based description. That is because they assume simplified contexts that do not reflect the complexities of the real environment, including the fact that stimuli have to be searched for rather than presented neatly as data.

In contrast, the second category of research has taken a broader view across information-seeking with the objective of understanding why people purposefully use particular channels of information (e.g. Anderson et al., 2001; Johnson et al., 1996, 1995; Elam and Liedner, 1995; Nunamaker, Applegate and Konsynski, 1988; Swanson, 1987; Daft and Lengel, 1986; O'Rielly, 1982; Tushman and Nadler, 1978; Galbraith, 1973, 1977). Theories developed through this research carry the implicit assumption that information-seeking is represented by the selection of information channels, and therefore imply that *information-seeking behaviour* can be characterised

by understanding *why* people select particular channels of information. Studies consist mainly of relationship studies aimed at investigating explicit factors that influence carrier selection. Theories therefore take a *macro perspective* that does not adequately reflect on variations in the *usage* of information channels, and consequently they contribute at macro-level towards understanding organisational information systems. One reason for this may be that the majority of the research noted above has come from the discipline of information science where the emphasis seems mainly on gaining macro-level understanding of people's information-seeking behaviours.

Importantly, these studies have either simplified the context or sometimes stripped the context in quantification. The theories produced by these studies are therefore presented either in relation to those simplified contexts or as context independent, which again adds to their limitations in terms of a context-based description.

1.2.4 The Need for Discovery of Phenomena

One main limitation with research literature is its inadequate reference to the complexities of the organisational context. This literature mainly describes how motivational factors and carrier characteristics can influence carrier selection (e.g. Johnson et al., 1996; Daft and Lengel, 1986; O'Rielly, 1982). But, it makes only limited reference to the fact that people are *organisational beings* who have complex interactions with their environment.

Apart from that, the other main limitation in research literature is its lack of emphasis on *channel usage*. The literature quoted above carries the implicit assumption that people make an optimum selection from a range of options available as information carriers. We, however, live in a world where people are constrained by the limited resources they have, and who are often left to figure out how to use them effectively. Thus, the optimality may not be seen explicitly in people's behaviour, but it does not mean people's behaviour is far out from being the optimum. Instead, it may be suggested that optimality can often be implicit. The researcher observed how people at XA based their decisions on the few data resources that were available. In this

context, an inquiry of *why* people select particular information carriers can give only a little insight into how effective these carriers are as information systems.

Furthermore, it is inaccurate to assume that people can always make optimum selection of information carriers. People act on their beliefs, which may not always be accurate. Also, changing circumstances might make those beliefs inaccurate. How would people react to these? Can the same theory be applied repeatedly until people arrive at their pragmatically defined fulfilment?

This research project therefore focused on the *second paradigm* that we stated above with the belief that there could be broader phenomena beyond people's explicit behaviours and conscious understanding, which are important to describe the nature of people's generic information-seeking function. The objectives of this research were therefore set to *discover* those phenomena within the context of the natural organisational environment where people are having complex interactions with their environment.

Hence, we suggest an alternative definition for information-seeking that does not explicitly refer to information carrier selection. Accordingly, information-seeking may be defined as *'the interrelated beliefs, motivations and actions through which people search and transform data into information and knowledge to underpin judgements about specific events in life'*. This research project assumes these explicit activities associate implicit phenomena. By exposing these, we might obtain a more comprehensive view of the information-seeking function that might help aligning organisational information systems more effectively with people's information-seeking behaviours.

1.3 Research Objectives

Firstly, section 1.1 suggested that organisations are embracing connectivity as a new paradigm for exposing decision-makers to wider resources of information. And, the effectiveness of organisational information systems within this paradigm has to be evaluated through a context-based description of the nature of people's generic information-seeking function, where the context itself is defined partly by information systems.

Secondly, section 1.2 suggested that research literature provides only a macro perspective on information-seeking in organisations that does not refer adequately to the fact that people live with limited resources and have complex interactions with the organisational environment. It suggested that the nature of people's generic information-seeking function might be defined by broader phenomena that do not have clear reflection in the perspectives suggested by research literature.

It has been, therefore, pointed out that existing theoretical perspectives are inadequate for providing a context-based description of people's generic information-seeking function of sufficient insight for evaluating information systems in the emerging paradigm of connectivity. Hence, it suggests the need for furthering these theoretical perspectives through empirical studies that investigate broader phenomena relating to people's behaviours within their natural organisational environment.

This leads us to defining the objectives of this research project as: *to develop a theoretical perspective of the nature of people's generic information-seeking function with reference to people as part of the natural organisation who interact with their environment that consists partly of information systems.* This therefore leads us to investigating the (1) *interrelated phenomena* that defined the *nature* of this function, and (2) relationships between these phenomena and the organisational context that is defined partly by information systems.

The following specific research questions were used to organise the study:

- *'How can we describe people's information-seeking function in their organisational decision-making tasks?'*, which leads to the questions *'what are*

the main phenomena associated with this process?' and *'how are these phenomena influenced by the organisational context including the presence of information systems?'*.

- *'How does the above perspective of information-seeking function reflect the state of the information systems in the organisation?'*.

It suggests that a sufficiently comprehensive theory of information-seeking would expose the true potential of connectivity in an organisation, and hence underpin suggestions for improving organisational information systems.

1.4 The Research Approach

This section provides an overview of the approach taken in this research to achieve the stated objectives. Comprehensive arguments regarding its suitability will be presented in Chapter 3.

This inquiry makes the explicit assumptions that (1) motivation to seek information and its subsequent fulfilment are subjectively defined, and (2) the context influences people's behaviour through their interpretation, and therefore the reality is socially constructed. It leads this inquiry into taking the fundamental stance that phenomena associated with information-seeking function are *implicit* and *too complex* to be hypothesised, and therefore need to be *exposed inductively* through people's interpretation of their reality. Thus, neither the phenomena nor the contextual factors that influence these phenomena were hypothesised, and instead they were expected to be defined and re-defined inductively during the research process.

Thus, confined by the above paradigm, the objectives of this research project were achieved through an interpretive field study carried out at two culturally contrasting organisations (XD and XA). This involved research into people's behaviours in seeking information for their decision-making tasks. These inquiries were then analysed using Grounded Theory techniques to expose implicit phenomena associated with information-seeking. These phenomena were then investigated at a conceptual level to suggest a theory of the nature of people's information-seeking function and its contextual aspects, which was used subsequently to draw implications for organisational information systems.

a) Interpretive Paradigm

The reason for using an interpretive approach follows the context of this research, which is an investigation of *behavioural phenomena* and their *contextual aspects*. The project takes the stance that people's information needs as well as the contextual presence is related to behaviour through people's interpretation, which leads to the ontological assumption that the reality is socially constructed (see Chapter 3).

Field investigation used in-depth interviews at both organisations. Thirty-six such interviews were carried out between the winter of 1998 and the spring of 2000, and these were supplemented by 8 months of observation at XA.

b) Research Sites

The two organisations XD and XA represented contrasting contexts for the investigation of behaviours of decision-makers. XA is a large and seemingly bureaucratic organisation where teams are physically dispersed, and therefore a large percentage of a person's information-seeking interactions are carried out through formal organisational routines. The company XD was selected purposely to contrast with the context represented by XA. The company XD is relatively small compared to XA, and it represents a soft culture that has underpinned the overriding of its formal organisational routines in favour of emergent informal channels. Field investigations at these organisations captured the finer differences in behaviours of their decision-makers that can be ascribed to the contextual differences highlighted by the two organisations.

c) Grounded Theory Techniques

Field data were analysed using Grounded Theory techniques (Glaser and Strauss, 1967; Strauss and Corbin, 1998). There were two main reasons for using this approach. Firstly, Grounded Theory techniques are inductive in that they support the *discovery* of phenomena, and allow the exploration of the complexities of the organisational context. Secondly, the data resulted from field investigations consist of scattered experiences of people in the organisation, which did not expect to converge coherently into case studies. Grounded Theory techniques provide a systematic means of abstracting from these scattered experiences, and at the same time navigating the field investigation towards exposing broader phenomena.

d) Limitations

There are limitations in the findings this research project. Firstly, this inquiry did not extend beyond the contexts represented by the two organisations XD and XA.

Secondly, the participants of the field inquiry were middle to senior management, and tasks investigated *excluded* lower-level routine operational decisions as well as top-level strategic decisions. Therefore, the theories presented in this dissertation are substantive to the context represented in field data, and hence any generalisation beyond these should be carried out cautiously (see Chapter 7).

1.5 The Structure of the Thesis

This dissertation contains seven chapters including this introductory chapter. They are laid out as following:

Chapter 2 - reviews the relevant literature to establish a basis for this investigation. It reviews three categories of literature. The first category inquires into the concept of information amongst the related concepts of knowledge, data and communication. The second category inquires into the cognitive aspects of information acquisition by decision-makers, which is focused on understanding people's mental activities during information-seeking. This also exposes the variability of human cognitive processes, suggesting that it is difficult to provide 'perfect data' to people. The third category reviews existing theories of information-seeking that have focused mainly on information carrier selection.

Chapter 3 - describes the methodology adopted in this research project. It provides arguments for adopting interpretivism as the inquiry paradigm and Grounded Theory techniques for analysing the field data. This chapter also describes fieldwork and the applications of Grounded Theory techniques in the process of analysis.

Chapters 4 and 5 - present the field data from companies XD and XA respectively. The objectives of these chapters are, firstly, to describe concepts that emerged from Grounded Theory analysis within their appropriate empirical contexts, and secondly, to highlight variations in information-seeking behaviours due to contextual factors. Field data are presented in the form of storylines, which are supplemented with 'conceptual descriptions' abstracted from memos that were produced in Grounded Theory process.

Chapter 6 - presents abstract level descriptions of the conceptual frameworks that were developed through Grounded Theory analysis of field data. These frameworks provide insights into people's information-seeking behaviours observed in previous chapters, and consequently they lead to the development of theoretical perspectives of people's information-seeking function.

Chapter 7 - concludes this dissertation by providing (1) discussions of the contribution to theory and practice from findings of this research, (2) a reflection on the methodology used, and (3) highlighting issues for further research that emerged through the research.

Chapter 2

Literature Review

2.0 Introduction and Overview

The objective of this chapter is to review existing research literature for the primary purpose of establishing a basis for this inquiry. It is important to note that this literature review progressed concurrently with the inquiry process by locating relevant literature at each stage of its development. However, presented in this chapter is a subset that sets the context most relevant to the findings. We shall begin this chapter with an overview of the broader literature base within which this thesis may be positioned. Our main focus in this chapter is however to carry out a detailed investigation of the most relevant literature that would provide a comprehensive view of our current understanding of information-seeking.

The primary aim of this research project has been described in the previous chapter as to make contributions to the field of *information systems* by suggesting improvements to organisational information systems from a perspective of underpinning people's information-seeking function. In addition to this, we suggest that the objectives of this research may be positioned effectively within the literatures of knowledge transfer/creation, information-seeking behaviour and organisational communication. The aim of this overview is therefore to describe how the objectives of this thesis may be positioned within a broader context that extends beyond its primary concern with information systems.

This overview begins with a description of how the concept of information-seeking that we aim to investigate has merged into the context of organisational activities. We may describe it through the notion that organisational activities are events of knowledge transfer (or creation) because people naturally prefer to act with a pragmatic understanding of the consequences of their actions. This they might

develop either tacitly or consciously. The organisation would also be interested in helping people to develop such understanding, and particularly to help people place their understanding effectively within the broader context of the organisation and its primary objectives. Thus, within this notion of seeing organisational activities as events of knowledge transfer (or creation), people's proactive acts of *information-seeking* may be seen as one primary mechanism, alongside the *proactive dissemination of information* by the environment, through which knowledge transfer/creation actually takes place. And importantly, the information systems may be seen as the underlying facilitator enabling these mechanisms to unfold.

Hence, our objective of researching *'what goes on with information-seeking'* may be seen as an issue that ought to be shared by the disciplines of both information systems and knowledge transfer/creation. However, because our main concern is the *mechanism itself* more than *its context*, we treat information-seeking in this thesis primarily as an information systems issue.

Our review of knowledge transfer literature has however indicated that information-seeking has not been addressed adequately within its domain, which further highlighted the potential contribution that might be made through this research project. One reason for such lack of reference to information-seeking may be that this literature has addressed issues mainly at macro level where the primary concern has been to highlight the *strategic significance* of the *concept* of knowledge transfer. Because of this, the issues relating to the *actual mechanisms of knowledge transfer/creation* had received similar macro level treatment. The main focus of the literature has been to suggest conceptual models of the various aspects of knowledge transfer that underpin the survival of the organisation. For example, the notion of the *transfer of best practices* upon which the competitive strengths of professional services firms were built during the past decade has emphasised the aspect of explicating both individual and group tacit knowledge (e.g. Sarvary, 1999; Davenport and Prusak, 1998). Another aspect was highlighted by Nonaka and Takeuchi (1995) who observed the importance of the continuous interplay between tacit and explicit knowledge in underpinning innovation, which they described as the *spiral of knowledge creation.* The more recent developments in *communities of practice* have emphasised the aspect of creating collaborative knowledge, or promoting groups to

develop by collaboratively holding tacit knowledge of economic value (e.g. Fetterman, 2002; Davenport, 2001; Kulkarni et al., 2000; Wenger 1998).

Thus, while investigating the strategic significance of knowledge transfer has been the primary concern in the literature, those issues relating to both technological and sociological aspects of organisational information systems, which are of primary importance for the achievement of knowledge transfer, have received secondary focus. The technological aspects are emphasised when knowledge is seen as something that could be effectively articulated, and sociological aspects are emphasised when knowledge is seen as something that is held tacitly by individuals and groups (e.g. Hansen et al., 1999; Spender, 1996).

However, significantly for this thesis, we argue that with macro level emphasis on knowledge transfer/creation mechanisms, one could go only as far as suggesting how to create a *potential* for the knowledge transfer/creation to take place. Thus, although our emphasis on technological and sociological aspects of information systems can suggest opportunistic environments for the knowledge transfer to take place, as long as our emphasis remains at macro level, we cannot judge the success of such environments at micro level where the things actually takes place. This importantly highlights the need for our focus on mechanisms at *micro level*, and notably it brings the concept of information-seeking into focus.

Now, seeing the above abundance by knowledge transfer literature, one would naturally expect information-seeking to have been addressed within information systems research literature. But, again this is not the case. Information-seeking has not received explicit concerns even within information systems literature, except for some scattered views that goes only as far as describing *'how to provide people data'* (e.g. Dennis and Carte, 1998; Spence and Tsai, 1997; Hwang, 1994; Vassey, 1991) and *'how to provide people accessibility to information resources'* (e.g. Elam and Leidner, 1995; Adam and Murphy, 1995; Carlsson, 1993). Even these views have limitations when we have to make inferences towards the behaviours of people who are *organisational beings.* That is because, a majority of this research has taken rationalistic approaches, and has emphasised building formal models of relationships while ignoring the complex interactions between people and their environments.

What would have been useful is an extension from the existing socio-technical research traditions in information systems (e.g. Mumford, 1995, 1986) to provide a socio-technical view of those natural organisational phenomena associated with information-seeking.

Although we have seen that socio-technical theory has served an effective paradigm for information systems thinking during the past two decades (e.g. Carayon and Karsh, 2000; Franklin et al., 1992; Eason, 1988; Gould and Lewis, 1983; Mumford and Henshall, 1979), there has not been much explicit concerns about how information-seeking takes place, or how it can be underpinned through emphasising socio-technical systems. The focus of socio-technical approaches has mainly been on the inclusion of human element in the development of information systems. For example, this has become a key concern with the Scandinavian traditions of information systems development (e.g. Kyng, 1995; Ehn and Sjogren, 1991; Kyng and Mathiassen, 1982). Iivari and Lyytinen (1999) suggested that 'infological' approaches (Langefores, 1966) to information systems development in the early seventies have evolved into the present mainly through the increased concerns over the social systems of the organisation. However, the contribution from this paradigm to the understanding of information-seeking has been minimal, and mostly at macro level.

Thus, any research findings on *'how people seek and fulfil information needs'* would clearly make useful contributions to the literature in information systems, particularly if people's behaviours were researched within their natural organisational life where they have complex interactions with the environment.

Thus, what can be concluded from this overview so far is that information-seeking as a mechanism of knowledge transfer (or creation) in the organisations has not received adequate explicit concerns within the research interests of both knowledge transfer and information systems researchers. This lack of reference to information-seeking in above literature has led us looking into other disciplines for building a basis for this investigation. Our focus has therefore been on the literatures of communication theory, cognitive psychology, information science and organisational communication.

One useful area of research that we focused on was information science and organisational communication (e.g. Anderson et al., 2001; Johnson, 1996; Johnson et al., 1995; Monge and Eisenberg, 1987; Swanson, 1987; Daft and Lengel, 1986; O'Rielly, 1982; Tushman and Nadler, 1978; Galbraith, 1977, 1973). The main reason for our concern here was that they have addressed the issue of information-seeking explicitly within their research interests. Their main research questions have been 'why people seek information?' and 'how people go about fulfilling their information needs?'. But, the limitation is that their emphasis has been to find answers at macro level, and therefore the implications they have made towards organisational information systems are also at macro level. A fundamental assumption in these studies has been that information-seeking is represented by the selection of information channels by the people, and their behaviours can be understood by investigating *why* they select those particular information channels. In contrast to this, our objective has been to investigate mechanisms at more micro level, which questions the above research traditions: 'would the selection of right information channels ensure that a person fulfils his/her information need?'. Our focus is therefore on investigating 'what goes on' at micro level within the natural organisational environment, and our findings might help deepening those existing theoretical perspectives of channel selection.

In the following three sections of this chapter, we shall review three main categories of literature to establish the scope of the existing theory-base for describing people's information-seeking function. The first category inquires into the concept of 'information' amongst the other related concepts of data, knowledge and communication, which might provide insights into the fundamentals that lye beneath any theory of information-seeking. One could make inferences from these theories by seeing information-seeking as a process of communication of messages in which individuals enter into iterative sequences of request-reply loops. These theories do not however make any references to behavioural and contextual aspects, and therefore are limited in scope for describing information-seeking within the natural organisational environment.

The second category of literature mainly comes from the field of cognitive psychology. Here we see information-seeking as purpose-driven, and people's

explicit behaviours in these acts might be influenced by how they structure the information internally to fulfil their purpose. The literature we have reviewed investigates people's cognitive processes that transform stimuli into information to create judgemental knowledge. This comprises research in both cognitive psychology and information systems, which has aimed at understanding how people make sense out of stimuli presented to them in the context of some decision-making task. It should be noticed however that, although cognitive behaviour is a main aspect of people's information-seeking function, this literature refers to the phenomena at abstract level that does not capture the complexities of people's real-world contexts. However, these theories have been useful for us to make inferences towards people's cognitive behaviours in their real world information-seeking activities. Importantly, they show that human cognitive processes are contingent on many factors, which underpins the proposition that *providing data* to people objectively is inherently difficult without knowing the people and their circumstances.

The third and final category of literature comes mainly from the disciplines of information science and organisational communication where information-seeking has received explicit concerns but at a more macro level than is emphasised in this thesis. This literature has however provided a useful macro framework to position our contributions towards the literatures in both information-seeking behaviour and organisational information systems.

In the final section of this chapter, we draw conclusions from the review of above categories of literature to highlight gaps in the body of knowledge where this thesis might make some useful contributions.

2.1 Inquiry into the Concept of 'Information': Fundamentals of Data, Information, Knowledge and Communication

This section inquires into the concept of information through reviewing basic concepts that describe the flow of knowledge from one source to another. These concepts have contributed to understanding fundamental mechanisms that lie beneath any theory of information-seeking by human beings. But they do not extend to provide a complete description of such events by incorporating the associated behavioural and contextual aspects.

The concept of information does not have a unique definition in research literature, and its meaning has been interpreted differently within different contexts. However, the concept of information is generically associated with the definitional states of data and knowledge, and therefore its meaning may be established in relation to those associated concepts. It is important to notice that theories of communication are subject to the definitional state of data, information and knowledge. Hence, one objective of this discussion is to establish appropriate definitions for the above concepts, which will be referred to throughout this thesis.

2.1.1 What is Knowledge?

Many of the complexities in the concept of knowledge can be attributed to definitional disagreements, some of which are purely linguistic (Machlup 1980). For example, Plotkin (1994) argued that knowledge is an adoptive process, extending the concept to the entire living world including plants. But this is much beyond what a commercial organisation would describe as knowledge, and certainly beyond the boundaries of this research. Therefore, the definition of knowledge has to be pragmatic.

Plotkin's argument is unique in that he included instinctive behaviours as part of knowledge, which was referred to as 'knowing by senses'. However, in the context of this research, the focus is to look for a concept of knowledge that produces behaviours beyond instincts where cognitive properties of the brain are involved either consciously or unconsciously. The emphasis is on the intelligent, or mindful

inferences by which people make judgements about unknown futures. Plotkin referred to this as 'knowing by mind'.

The mind, memory, intelligence and knowledge are interrelated elements of a single system. Morris (1932) described the mind as a 'static pattern of relations'. Accordingly, memory can be discrete with no relationships among what is in it, and the 'substance' that holds the interrelations is the mind. Alternatively, the mind was defined as a 'process of forming ideas' by Dewey (1929), later developed by Sandelands and Stablein (1987). According to this latter explanation, the mind is not a substance but a dynamic process, and intelligence is the mechanism that drives this process. For Sandelands and Stablein, intelligence is the 'ability to maintain a working similarity between mind and nature'. Plotkin (1994) implied that knowledge is both mind and memory, and mind is the result of intelligence, which continuously updates the memory. Spender (1996) stated that 'memory can only serve intelligence...memory cannot be understood without understanding the intelligence it serves'.

Although it was established that knowledge is a phenomenon within memory and mind, there are differences in the way people 'know' different things. The most fundamental difference is whether the mind is detached from or attached to the things that are known. This latter was not emphasised in the philosophical traditions until the middle of the nineteenth century, which Nonaka and Takeuchi (1995) referred to as the 'Cartesian dualism'. The detached knowing is the *prepositional knowledge* (Moser and Nat, 1987) where things are known by description. James (1950) referred to it as 'knowledge about' and Machlup (1980) referred to it as 'knowing that'. In contrast, the attached knowing is non-prepositional knowledge (Moser and Nat, 1987) or 'knowledge of acquaintance' (James, 1950) or 'knowing how' (Machlup, 1980). According to Machlup (1980), the difference between know-that and know-how is that in the latter 'the practical capacities to perform are so far moved from conscious mental acts (e.g. semi-automatic muscular movements)'. This means that knowing becomes *cognitively unconscious* and this is known as 'procedural knowledge' or 'tacit knowledge' (Polanyi, 1962, 1967).

In addition, Machlup (1980) presented 'knowing what' as another category of knowledge. It contains several know-thats and know-hows plus 'sentimental and emotional' elements that cannot be categorised as either of above. For example, a salesman's knowledge about his/her clients includes knowing a lot of things. Similarly, James (1950) implied that a person's real knowledge comprises theories wrapped with practical commonsense that is acquired through acquaintance. Such commonsense knowledge has been described as knowing through input-output relationships (Kerstholt and Raaijmakers, 1997).

It is important to notice that above primary classification of knowledge into prepositional and non-prepositional types is based to a large degree on their usefulness. Some knowledge is useful in declarative sentences. But, other knowledge, although possible to represent as declarative sentences, becomes useful only if manifested in the form of a skill (e.g. riding a bicycle). This brings in the important question of how knowledge can be transferred.

2.1.2 Knowledge and Information

The concept of knowledge as a phenomenon that is purely internal to human beings, or such that knowledge can exist only within the human mind, brings in some confusions in the use of the word 'knowledge'. How can we explain objectified knowledge, or the knowledge that is written down? Does a library on its own contain knowledge? To eliminate such confusion it is important to introduce concepts such as *information* and *semantics,* and investigate their relationship to knowledge.

In the most widely used definition, data, information and knowledge are arranged hierarchically with data at the bottom and knowledge at the top (e.g. Davenport and Prusak, 1998; Demarest, 1997). Data consist of messages from reality, which are combined and transmitted to the human mind as information, and that creates knowledge. But, the main problem concerning this model is that it does not define boundaries clear enough and therefore the three terms are often used interchangeably. *Information* is the most popular 'umbrella term' (Davenport 1997) that is used in place for data and knowledge.

Information is a critically important concept within the context of knowledge. Machlup (1980) defined information as the 'act or the process by which knowledge is transmitted'. This retains the original idea that knowledge is purely an internal state of human beings, and information is the link between the human mind and everything that is external. Information generated by 'acts of transmission' has the ability to change this internal state that is referred to as knowledge. Similarly, Farradane (1976) emphasised communication of knowledge and defined information as 'representations or surrogates of knowledge'. But, the difference between Machlup's and Farradane's concepts is that Machlup considered communication as a closed process involving both senders and receivers, whereas Farradane mainly considered the transmission side. His consideration did not include the effect on the recipient, or the meaning to the recipient. These two approaches, however, highlight an important aspect in the communication of knowledge. That is, although communication is a closed process, one could often encounter the problem about who the recipient is, and without knowing the recipient how can we make him/her understand? Farradane suggests that the sender can objectify the knowledge as data that he/she thinks best represents his/her knowledge. But, whether this can be called 'knowledge' has to be investigated through the concept of semantics.

Semantics is the study of meanings attached to information. The acts of communication alone do not change the recipient's state of understanding unless they are meaningful (Mingers 1996, Luhmann 1990, Dretske 1981, MacKay 1956). There are some contrasting views about information carried by a message. The view presented by MacKay (1956), developed further by Luhmann (1990), states that information is a product of meaning such that information from a message is dependent on the meaning given to it by the recipient. But, the meaning is a function of selection, and so becomes information, which is therefore not primarily the content of a signal (Mingers 1996). In contrast, the view presented by Dretske (1981) states that meaning is produced by information. He defines information as *'the prepositional content of a signal'*, which is objective and independent of the receiver. Yet, the meaning generated by information is subjective so that it depends on the cognitive state of the receiver. Thus, according to Dretseke's theory, a book or speech carry fixed amounts of information, but changes in the state of knowledge they produce depend on the meaning generated by the receiver. In fact, MacKay's and

Luhmann's concept of information refers to what is actually *communicated* in an act of transmission, but that of Dretske's refers to both communicated and not communicated.

In the light of this information theory, it can be argued that objectified knowledge never exists. If a person converts his/her knowledge into words, then it becomes a signal for reinterpretation by another person, through a semantic filter, and only then it becomes knowledge again. However, some attempts have been made to fix the meanings of messages, or to define a meaning that *ought to be* (absolute meaning) in a message (e.g. MacKay, 1956), but this has never developed to an acceptable level (Mingers, 1996; Godert, 1996). Alternatively, it is possible that the *intended meaning* and the *interpreted meaning* of a message become almost the same at a pragmatic level. It means that they converge into a single meaning concerning the practical consequences (Habermas 1979). It follows that objectified knowledge can exist at a pragmatic level when information becomes synonymous with knowledge.

There are other theories that link knowledge and information, and some of these refer to the concept of *data*. Downs (1957) defined knowledge as 'the basic causal structure of some field of operation' where information 'provides current data on the variables in that field'. Downs was mainly referring to 'contextual knowledge', and did not emphasise the semantic aspect. Churchman (1969) said 'information...is essentially raw data...knowledge...is interpreted data'. A contrasting view is presented by Checkland and Scholes (1990) who stated that 'information is data plus meaning', which means that information is already interpreted. Drucker (1988) presented a very similar view that 'information is data endowed with relevance and purpose'. Yet, the distinction between data and information is imprecise and both terms are used interchangeably in many situations. Davenport (1997) defined data as 'simple observations of states of the world' and through human intervention produces information. But, some 'data' is known to have comes into existence through human intervention in the first place. For example, a *red book* for one person can be a *maroon magazine* for another. Therefore, as Spender (1996) stated, data are not always an 'unproblematic or unmediated message from the reality'. This being the case, Spender suggests that it is rather less confusing to treat data too as *information, but one with a very simple structure.*

2.1.3 So, What is Information?

Based on this discussion, we suggest that information can be best described as 'meanings assigned by a person to stimuli, or signals, resulting from communication'. A person can assign more than one meaning to stimuli depending on the context in which it is interpreted. Therefore, stimuli can produce a *set of information* for a person from which he/she selects the ones that are appropriate for the context defined by the purpose. We may call these stimuli 'data', which can be either mediated or unmediated messages from reality. For example, data can comprise numerical figures, reported events or even expert opinions. This being the case, Drucker's (1988) definition of information, which states: 'data endowed with relevance and purpose', may be a suitable one to adopt in this dissertation.

It may also be stated that information is a product of both data and knowledge because people always assign meanings to stimuli based on their knowledge. But, this information will in turn alters people's knowledge. This however shows that both information and knowledge are phenomena purely within people's minds, which can only be created subjectively, but can never be transferred. In this theoretical context, the phrase 'information-seeking' will have no real meaning. However, 'information-seeking' can be seen as a pragmatic statement where people 'seek to be informed' by seeking appropriate stimuli, and expecting them to be interpreted to create the information. Thus, information-seeking may be seen reasonably as a data-search. However, it may not be seen a static event of data-search because it is purpose-driven, and how this data fulfilling the purpose might constantly influence (say navigate) the data-search.

This purpose-driven aspect of information-seeking therefore suggests the need for understanding the mental activities of a person. In other words, it is useful to know the cognitive aspects of *information integration* through which people fulfil their purpose because this might in turn reflect in people's behaviour in searching the data. This was however not part of the discussion of this section. This section inquired 'knowledge' from a general and broad perspective to understand 'what it is?', and we saw knowledge as a temporal effect of information accumulation. What is required regarding information-seeking is to understand how knowledge is created from data

(or stimuli) for the purpose of making judgements about specific events in life. The next section therefore reviews literature on cognitive aspects of decision-making mainly for the purpose of obtaining some insights into *cognitive processes* that transform data into judgemental knowledge.

2.2 Theories of Information Acquisition and Human Cognitive Processes

This section reviews literature on cognitive aspects of decision-making to obtain insights into mental activities of people in their information-seeking activities. It carries the underlying assumption that information-seeking is a purpose-driven activity where this 'purpose' is subjectively defined. Therefore, people's explicit activities of searching data are facilitated (or navigated) by the internal structuring of information to fulfil their purposes. We may describe this *purpose* as to make judgements about unknown futures.

One category of literature comes from the field of cognitive psychology (e.g. Maule and Edland, 1997; Hastie and Pennington, 1995; Payne et al., 1995; Stiensmeier-Pelster and Schurmann, 1993; Kaplan et al., 1993; Huysmans, 1970; Churchman and Schanblatt, 1965; Jung, 1923). The main objective of these studies has been to understand how human cognitive and information processing systems work to extract information from various stimuli to make judgements and decisions relating to events they encounter in life.

Another category of literature comes from information systems research (e.g. Dennis and Carte, 1998; Spence and Tsai, 1997; Hwang, 1994; Vassey, 1991; Winograd and Flores, 1987; Sage 1981; Zmud, 1979,1979a; Mason and Mitroff, 1973; Doktor and Hamilton, 1973). The objective has been to understand human aspects in the design of information systems. These studies have focused on understanding factors that influence people's response to *presented* data, and in turn to understand how information systems can be made effective in supporting their decision-making activities.

This review suggested, firstly, the importance of using the concept of the mental model for understanding the aspect of information integration that makes judgements leading to decisions. Secondly, it suggested the variability of human cognitive processes that are contingent upon many factors including personal differences, presentation and volume of data, degree of stress and the nature of tasks. This perspective underpins the important proposition that presentation of data to people objectively is inherently difficult without knowing the people and circumstances that

surround those people. This proposition in turn underpins the fundamental view that information systems ought to facilitate *subjective search* for information (see section 1.1). It also provides a basis for describing the phenomenon of *opaqueness in data* that emerged through empirical investigations (see section 6.2).

2.2.1 The Concept of the Mental Model

The fundamental assumption in cognitive psychology is that people create mental models of situations in the environment that are most relevant to the current or anticipated actions. People's mental life is devoted mostly to create and update mental situation models that allow them to navigate themselves through their daily lives (Hastie and Pennington, 1995). We may therefore see that people seek information based on some mental situation model, which they plan to use for making judgements about unknown futures.

Mental models are seen as vehicles through which experience is structured and information acquisition is facilitated (Johnson-Laird, 1983; Norman, 1983). Through the use of mental models, people understand phenomena, make predictions and decide actions. They capture the cause-and-effect relationships that a person believes to underlie his/her environment. For example, the ways in which executives deal with complexities in their tasks is understood through the concept of mental model (Isenberg, 1985; Kotter 1982; Jacques, 1976; Mintzberg, 1973). The effectiveness of an executive's decisions is seen as dependent on the quality of his/her mental model (Mintzberg, 1973).

Kerstholt and Raaijmakers, (1997) suggested three types of mental models:

- Analytical models that specify relationships amongst system parameters and their temporal characteristics,
- Normative models that *prescribe* relationships between inputs and outputs, and
- Self-calibrated models that imply input-output relationships based on experience.

It should be noticed that any of these types would not exist in pure form, and a person's mental model is therefore a combination of all these types.

Yet, the stability of some of the above categories is in question. Diehl and Sterman (1995) have argued that people's cognitive capacity is inadequate to see insights of even relatively simple systems intuitively. This means that a person's capacity to process information is inadequate to understand complex algorithms that underlie the behaviours of systems in the real world. Hence, it may be argued that human mental models consist mainly of self-calibrated input-output relationships because even normative models are subject to alteration through experience.

2.2.2 Mental Models in Static and Dynamic Decision-making

Research describes mental models in relation to two main types of decision-making, namely *static* and *dynamic*. Static decision-making assumes that each task is an isolated event that does not carry any temporal effects, and therefore they are independent of one another (e.g. Maule and Edland, 1997; Hastie and Pennington, 1995; Payne et al., 1995; Stiensmeier-Pelster and Schurmann, 1993; Kaplan et al., 1993). In contrast, dynamic decision-making assumes that tasks carry temporal effects where each task consists of a series of decision-makings events, and they are sequentially dependent (e.g. Kerstholt and Raaijmakers, 1997; Kerstholt, 1995; Klein et al., 1993; Sterman, 1989; Edwards, 1962). Furthermore, dynamic decision-making assumes that the environment changes autonomously as well as a result of the decisions that are made.

A majority of real-life decision-making tasks are dynamic where people are seen as engaged in processes of navigating systems they 'associate commonly' through regular intervention. It may be suggested that mental models are *constructed* in static decision-making, whereas they are *remoulded* in dynamic tasks, and this is a fundamental difference between these types. Little research has focused on understanding how information processing is different between remoulding and constructing mental models. A vast majority of literature is focused on static

decision-making, and it is from this that inferences are often made about dynamic tasks.

Static tasks are characterised by the selection of decision strategy. These strategies, sometimes known as decision heuristics, are seen as the rules and procedures for weighing and combining information to create mental models (Weber et al., 1995). Hence, strategy selection influences the framing of information in decision-making tasks. Payne et al. (1995) stated that a person carries a repertoire of strategies or decision heuristics, acquired through formal training, natural acquisition or experience. However, the selection of a strategy in a decision-making task, and therefore the way in which information is treated, is seen as highly contingent upon the nature of the task and contextual factors such as complexity and time pressure, and is also highly adoptive (Ford et al., 1989; Payne et al., 1995).

Dynamic tasks are characterised by timing of decisions, perception on feedback and strategy selection (Kerstholt and Raaijmakers, 1997). Feedback is of particular importance as it provides information about evolution or dynamics of the system in focus where people can *remould* their mental models. However, experimental research has shown that people often did not take feedback accurately into account (e.g. Brehmer, 1992; Diehl and Sterman, 1995). Hence, research indicates that people have limited ability to keep track of changing system states so that, although people become confident in making decisions, they do not improve their mental models of situations over time (e.g. Tolcott et al., 1989; Lusk and Hammond, 1991; Huber, 1994).

It should be noticed, however, that the above theories have been developed exclusively through experimental research on 'created situations', which usually have little resemblance with situations we encounter in real life. In particular, these theories relate to simplified contexts that do not reflect complex interactions people have with their environment. However, these findings can still be used to gain a casual understanding of people's cognitive states that might influence their information-seeking activities.

These findings helped us in observing analogous phenomena of the real world in our investigations of empirical contexts of the organisations XD and XA. One important conclusion was that real world decision-making is neither static nor dynamic but a combination of both kinds, and therefore mental models are not totally remoulded from previous events but they are partly reconstructed. Hence, we may suggest that people seek information in a cognitive context that is best described as *restoration* of mental situation models, and their activities are navigated by this restoration process.

2.2.3 Can We Present 'Perfect Data' to People?

Research has implied consistently that human cognitive processes are a variant, and therefore the concept of 'perfect data' is contingent on many factors. Literature has examined cognitive processes in a context defined by four main factors: individual, task, data and the environment.

The presence of different *cognitive styles* is one of the fundamental factors that highlight differences in people's response to data. Churchman and Schanblatt (1965) and Huysmans (1970) observed that people carry preferences in their use of data, and that the data are ignored when it is presented in a format that is incompatible with their cognitive style. Mason and Mitroff (1973) suggested a more comprehensive framework in their characterisation of information systems. They argued that a person of a particular psychological-type, facing a particular kind of a problem, would require evidence (data) presented in a particular mode of presentation. There are other models of the cognitive style proposed (e.g. McKeeney and Keen, 1974; Driver and Mock, 1975; Bariff and Lusk, 1977). All these carry underlying similarities because they all were based on Jung's (1923) stereotypes.

The concept of cognitive style suggests that a 'fit' between task and data carries no real meaning in the absence of a human being. For example, Bariff and Lusk (1977) pointed out that, depending on the task, certain people (systematic individuals) would search the data for causal relationships leading to analytical type mental models, while others (heuristic individuals) would search the data through trial-and-error sequences. Therefore, the way data are presented should refer to both the task and the cognitive

style. Vassey (1991) and subsequently Dennis and Carte (1998) further highlighted the above perspective by putting forward their 'cognitive fit theory'. They suggested that the speed and accuracy of decision-making depend on the 'fit' amongst (1) the decision process, (2) the task, and (3) the presentation of data, where the decision process is variant on cognitive style. They further argued that in the case of a mismatch amongst these, either the data will be transformed or the decision process will be altered for a better fit, but it will lead to longer decision times or lower accuracy respectively.

It should be highlighted here that although literature has taken an objective perspective over the nature of the task, it can be highly subjective in real life, which adds to complexities of presenting data to decision-makers. Although researchers have observed that people change their decision strategies when tasks become difficult, and therefore change the way the data are framed (e.g. Olshavsky, 1979; Payne, 1976), such states may not be observed objectively, and therefore these theories offer only little help in presentation of data.

The literature sees the importance of the environment on human cognitive processes. However, these studies do not refer to the complex interactions between people and the environment, and instead they model these environmental influences as *stress* developed within the person.

Janis and Mann, (1977, 1976) developed a conflict model of decision-making in which they focused on the 'psychological stress' arising from decision conflict. Although they did not explicitly address individual differences, they have implied that the manner in which people cope with stress defines the mode of information processing, which in turn governs the type and the amount of information preferred by the decision-maker.

Environmental stress has been modelled widely using time pressure on decision-making. Payne et al. (1988) stated that people respond to time pressure by:

1. accelerating the information processing
2. filtering more relevant information hence reducing the information processing
3. altering the decision strategy

Payne et al. (1988) further stated that the responses are adopted sequentially such that if people find acceleration inadequate then they would seek filtration. However, later research has pointed out that adaptations of the responses are dependent on *personal differences*. For example, Stiensmeier-Pelster and Schurmann (1993) showed that people, who can be action-oriented or state-oriented (Kuhl, 1984), would respond to time pressure by filtration of information and acceleration respectively. Furthermore, research has shown that personal differences have manifested even in the alteration of decision strategy under time pressure (Kaplan et al., 1993).

This brief account of research findings indicates the variability inherent in people's cognitive processes. It shows that ways in which people frame data for a specific decision-making task is sensitive to individual differences, natures of the task, environmental stress, and presentation of stimuli. Hence, this literature suggests that it is inherently difficult to *present* appropriate data to decision-makers without knowing the people and their circumstances.

These findings therefore underpin the philosophy underlying the paradigm of connectivity, which was described as mainly creating environments for people's subjective searches of data more than trying to provide this data objectively. These imply that there is no objective 'fit' between data and tasks, and therefore customisation of data in the context of the task and environment is a main factor that influencing people's efficient interpretation of data. It will be shown later that people often encounter insufficiency of information in their real-world tasks because of inadequate customisation of data.

2.2.4 Limitations of Cognitive Theories

Although research has provided rich insights into cognitive aspects of information-seeking, these still have limitations regarding the objective of this research. Our objective is to describe people's generic information-seeking function taking into consideration that people are organisational beings who have complex interactions with their environment. But, cognitive theories have been developed from simplified contexts mainly to describe abstract phenomena. Hence, there are limitations in

making inferences from these findings to describe the above generic function. Nor can these studies be repeated within real environment due to its measuring problems.

These limitations have two main aspects. Firstly, in experimental research, people were not expected to embark on searching for the data, but instead they were *presented with the data.* And furthermore, people were assigned clear tasks. These are analogous to organisational decision-makers performing well-defined tasks by relying purely on the data that is *presented* to them objectively via printed documents, computer screens or telephone. In real-life however tasks are not always well-defined to decision-makers, and they usually have to embark on *searching* for the data. These complexities are not reflected in the above theories. Secondly, experimental tasks did not induce sufficient feeling of *accountability* within people towards the decisions they were supposed to make. But, in real life, decision-makers are accountable even for relatively static tasks, and that defines one important aspect of their treatment of information.

Hence, research in information-seeking clearly requires a different approach than cognitive studies, which investigates people in relation to their natural environment. However, this might again bring the limitation of not adequately capturing the associated mental phenomena. One option available to the research is to make casual use of above abstract concepts, which we have adopted to some degree in this research.

The next section reviews findings of the researchers who have taken a macro perspective on the information-seeking function.

2.3 Theories of Information Carrier Selection

The third category of literature we reviewed below has taken a macro view across the entire function of information-seeking (Anderson et al., 2001; Higgins, 1999; Suh, 1999; Salterio, 1996; Johnson, 1996; Johnson et al., 1995; Adam and Murphy, 1995; Vlahos and Ferratt, 1995; Elam and Liedner, 1995; Auster and Choo, 1994; Markus, 1994; Glazer et al., 1992; Dukerich and Nichols, 1991; Lewis, 1991; Nunamaker et al., 1988; Swanson, 1987; Daft and Lengel, 1986; O'Rielly, 1982). Unlike the previous category, these studies have inquired into the above function within the context of the real environment, and they carry either an explicit or implicit objective of describing people's information-seeking behaviour within their real-world context. These studies however carry the implicit assumption that decision-makers have access to multiple sources of data and media of communication from which they make optimal selections. These studies may be therefore encompassed within a definition that says information-seeking is *'the purposive acquisition of information from selected information carriers' (Johnson, 1996).* These theories therefore carry the implicit assumption that information-seeking is represented by the selection of information carriers, and people's behaviour can be characterised by inquiring why they make such selection.

Johnson (1996) described information carriers as the *'primary repositories of information available to individuals'*. A carrier is seen as the combination of a channel, sources and messages, but meanings of words are not always clear. Johnson used the word 'channel' to refer to the 'medium of communication', but it was found that the word 'channel' is sometimes used with the meaning of 'carrier' (e.g. Swanson, 1987). In this dissertation, we use the word 'channel' to mean 'carrier'. Thus, for example, a *meeting* is an information channel, which uses face-to-face conversation as the medium, and it can contain multiple sources with each containing multiple messages. Again, the telephone is a medium, and talking to a specific person over the telephone creates an information channel.

There are several competing views about how people select information carriers. These can be broadly categorised into two. One category of views has focused mainly on media selection (e.g. Daft and Lengel, 1986). These carry the implicit assumption

that the same data can be acquired through many media, and therefore selecting the appropriate medium is a main aspect of information-seeking. Other category of views has focused on selecting both the source and medium (e.g. Anderson et al., 2001; O'Rielly, 1982). These studies have investigated factors that influence people's selection of particular information carriers.

2.3.1 Perspectives on Media Selection

Some researchers saw that selection of appropriate communication media is a main aspect of information-seeking. They saw people's information needs were having two different aspects. One may be described as the 'content', which is the answer to the question: 'what information?', and the other may be described as the 'nature', which is the answer to the question: 'what kind of information?'. Research in this arena concerns the latter aspect, and suggests that it appeals to the richness of communication media (Daft and Lengel, 1986).

Research suggests that the nature of people's information need is defined by the combination of two mental states known as *uncertainty* and *ambiguity*. Early research concluded that *uncertainty* is the force that drives decision-makers to seek information (e.g. Tushman and Nadler, 1978; Galbraith, 1977, 1973; Shannon and Weaver, 1949). This view carried the implicit assumption that solutions to problems exist objectively but people's knowledge of problem situations is uncertain due to lack of information. Uncertainty was described by Galbraith (1977) as the 'difference between the amount of information required to perform the task and the amount of information already possessed', which implies that uncertainty would be reduced with the accumulation of information. It is important that, under uncertainty, people can raise questions to obtain answers and hence reduce the uncertainty (Daft and Lengel, 1986).

Subsequent research exposed a further aspect of the information-need, which was described as *ambiguity*. Ambiguity refers to the existence of multiple and conflicting interpretations of organisational situations (e.g. Daft and Lengel, 1986; Weick, 1979; Mintzberg et al., 1976). It follows that, when problems are ambiguous, solutions do not exist objectively. Thus, ambiguity can be distinguished from uncertainty in the

sense that people are unable to raise clear questions to obtain the required information. Pioneering observations are attributable to Mintzberg who observed some decision-making situations in organisations for which alternative solutions could not be defined.

Daft and Lengel (1986) suggested through conceptual studies that uncertainty and ambiguity could exist in combination and drive the behaviours of decision-makers to seek information. They showed that uncertainties and ambiguities occur due to:

1. Inferiorities in the technology used in the organisation,
2. Poor interdepartmental relations and
3. Turbulence in the external environment.

They suggested that uncertainty and ambiguity can be addressed through the selection of appropriate media of communication. As such, uncertainty could be addressed through the *amount of information* while ambiguity can be addressed through the *richness of information.* Thus, rich personal media such as face-to-face meetings can reduce ambiguity while not-so-rich impersonal media such as formal information systems could be used to reduce uncertainty. One important argument of Daft and Lengel (1986) is that ambiguity could not be reduced by increasing the volume of data. In later research, Glazer et al. (1992) showed that the availability of certain data could increase ambiguity, and force people to make 'locally rational' but 'globally sub-optimal' decisions.

Daft and Lengel (1986) take a prescriptive view of media selection where they suggested that it *ought* to be determined by the 'fit' between information-need and the ability of the media to deliver the amount and richness of information. However, in later research (Trevino et al., 1990) they followed a descriptive approach and tried to describe 'what goes on' where they referred to the influence of personal differences, contextual factors and media symbolism. Here they distinguished between 'media sensitive' individuals who select media to fit the level of equivocality (ambiguity) in their situations and 'media insensitive' individuals who select media randomly. They observed that former category outperformed the latter because the latter encountered either too many cues that cause them confusion or too few cues that did not reduce their uncertainty or the ambiguity.

This research however carries the limitation that, although theories referred to people in their real environment, they did not capture the complexities of that environment, particularly interactions between people and their environment. This is mainly because media richness theory was focused on medium itself, but did not give much concern to the social context where those media were utilised (Johnson, 1996). Hence, although these theories offer a rich perspective at the information-seeking function, they have limitations regarding a context-based description of that function.

A competing perspective for the media richness theory is the social information processing view (Fulk et al., 1987). This looks at communication media from a social perspective to describe implicit constraints imposed on media-use by social values. Accordingly, people may be willing to use, or be reluctant to use certain media, despite what they see as optimal in the context of the information need. This may however be seen as an environmental constraint upon media richness theory. For example, Daft et al. (1987) treated 'media symbolism' as a contextual constraint alongside time and distance.

2.3.2 Perspectives on Information Carrier Selection

While the previous category of research emphasised media selection alone, another category of researchers perceived the importance of seeing both the source and medium together to create an information carrier (e.g. Anderson et al., 2001; Von Seggern, 1995; Johnson et al., 1995; Swanson, 1987; Hardy, 1982; O'Reilly, 1982). The objective of these studies has been to understand what factors influence people's selection of particular information carriers. In effect, these studies have examined many aspects including carrier characteristics, perceived quality, individual differences (including demographic factors) and contextual factors for their relationships with the selection of information channels by decision-makers. But, they have consistently concluded that accessibility and familiarity of those information channels to the people are the most influential in their selections.

Johnson et al. (1996, 1995) and Swanson (1987) have developed formal models of information-seeking. Swanson (1987) developed a channel-disposition model that

relates individual attitude towards a channel and his/her actual use of the channel in the context of information and channel supply-demand structure in the organisation. Swanson described this relationship through a factor named 'value' that carried 38 parameters for the characteristics of the information carrier *perceived by the user.* This factor was found significant, but not to the extent to become the prime determinant of channel selection. This implies that information channel selection is influenced by factors other than those relating to people's perceived value over those channels.

Johnson et al. (1996) proposed that perceived relevance of information provided by a carrier might be depended on four antecedents (motivating factors) to information seeking and carrier characteristics. Johnson modelled carrier characteristics using two parameters: (1) editorial tone, which means perceived credibility, and (2) communication potential, which means the perception of the manner which information is presented. This study concluded that carrier characteristics had the most influence while antecedents showed only little influence.

Many other researchers have observed that decision-makers generally preferred more accessible oral communication as opposed to text-based communication, with the exception of references made to their own records (e.g. Von Seggern, 1995; Jain and Triandis, 1990; Tushman, 1982; Mintzberg, 1973). It is important to notice here that the preference for oral communication is not because it is richer than the text, but because it is more accessible than the text. O'Reilly (1982) argued that it is both ambiguities inherent in information and pressures to produce outcomes that drive people to seek easily-accessible sources. He stated that people would establish 'credible or trustworthy' sources over time and continue to use them irrespective of the quality of information. A similar phenomenon was observed by March and Simon (1958), which they described as 'self-reinforcing'. However, in contrast, Tushman (1982) claimed a linkage between high-performing individuals and extensive patterns of oral communication, which implied that oral communication is of better quality anyway.

The influence of accessibility and familiarity on information channel selection was further emphasised in a recent study by Anderson et al. (2001), which followed a

multi-faceted approach. They proposed that the influence of accessibility should be studied using the following comparisons:

- own records vs. seeking from others,
- oral vs. written,
- internal sources vs. external sources and
- direct communication vs. mediated communication.

They concluded through survey-based research that people prefer to use their personal contacts, both internal and external, before using formal textual sources other than their own records. They attributed this behaviour to the accessibility and familiarity of those data sources.

The above study implies that the concept of accessibility should extend beyond objective aspects such as the distance, time or media into types of communication links that has been established. In the above study (Anderson et al., 2001) as well as in previous studies (e.g. O'Reilly, 1982) a clear distinction has been made between personal contacts and formal contacts. However, these studies have mainly taken an objective perspective that does not take into account people's personal qualities or the environmental context.

Some research focused on understanding the nature of communication links in organisations that people used for seeking information (e.g. Adam and Murphy, 1995; Carlsson, 1993; Eisenhardt, 1990; Monge and Eisenberg, 1987). These aimed at exposing specific organisational phenomena that extend beyond the long established formal/informal distinction. One of the important findings in the context of this research is the fact that organisations are based on institutionalised links and emergent or evolving links (Monge and Eisenberg, 1987). Decision-makers use institutionalised links to obtain information relating to established aspects of their role. Emergent links are those that emerge in the context of a particular task, which decision-makers may decide to maintain for future use. Adam and Murphy (1995) found through interpretive research that decision-maker's relationships with superiors and subordinates are mainly based on institutionalised links while their relationships with peers are mainly based on emergent links. They found that while institutionalised vertical links offered greater control of operations, the emergent

horizontal links speed up the decision-making process. Hence, it suggests that accessibility is not an objective property of information sources, but may be created by people depending on the nature of the social and cultural environment. This research suggests that organisations might have the capacity to create accessibility through emergent channels, but the true nature of this can be exposed only by inquiries into people's interpretations of their environment.

2.3.3 Limitations of Carrier Selection Perspectives

This literature suggests that information-seeking is represented by the selection of information channels. While some research suggests that decision-makers ought to select media of communication appropriately, based on uncertainty and ambiguity in their tasks, the other research suggests that decision-makers are organisational beings who are constrained by the environment in which they live, and therefore select information channels based predominantly on accessibility and familiarity criteria.

The limitations of this research lie mainly in the macro nature of the perspective it has taken towards the information-seeking function. From these findings, we are unable to describe 'how do people within a particular organisational setting seek information to fulfil their information needs?'. One reason is that both above streams of literature see information-seeking from a static perspective. They see information-seeking function comprising events of successes and failures due to optimality and sub-optimality of sources and media selection. They are not explicit on the aspect that information-seeking is a process that begins with motivation and ends with a pragmatically-defined fulfilment. In particular, they do not address the questions: 'what happens following a failure to select right information channels?' and 'can subsequent events be seen as completely new events of information-seeking or should they be seen as continuations of the same event?'.

A second reason is that this literature does not refer adequately to the complex interactions between decision-makers and their organisational environment. Although most studies were based in real organisations, attempts of quantification have either simplified or stripped rich contextual information. Therefore, theories are presented

either within those simplified contexts or as context independent. Even the informal approaches have focused on phenomena with little effort to place those within complexities of the organisational environment.

2.4 Conclusions

This chapter reviewed three categories of literature for establishing a basis for inquiring into people's information-seeking function. The first category of literature looked into the concept of information amongst its related concepts of knowledge, data and communication. It suggested that information may be defined as 'meanings attached to data', and information-seeking as 'searching data to fulfil specific purposes'. This latter suggested the importance of understanding people's mental activities because how people structure information to fulfil their purposes might influence data searching activities. The second category of literature investigated human cognitive processes associated with information acquisition. It suggested the usefulness of the concept 'mental model' in understanding people's mental activities during information-seeking. It also highlighted the inherent difficulty of presenting data to support decisions without knowing the people and their circumstances. This literature provided rich insights into people's mental activities, but they had limitations in the context of research objectives, mainly because these findings referred to abstract phenomena that cannot be effectively described within complex interactions that people have with their environment. It therefore needed an approach that sees people as organisational beings. Hence, the third category of literature investigated existing theories of information carrier selection by organisational decision-makers. It highlighted two views. One stated that people ought to select appropriate media based on uncertainty and ambiguity of decision situations. The other implied that people select information channels mainly based on accessibility and familiarity criteria.

This review of literature clearly highlights the segregation in existing theoretical perspectives regarding people's information-seeking function (Figure 2.1). This segregation comprises macro theories and micro theories, which have aimed to describe information-seeking from two different perspectives.

Macro theories have taken a broad view at information-seeking to suggest that it is the result of *motivation and exposure*. It means that people seek information when they have been both motivated into it and exposed into adequate sources of information. We could relate these to organisational information systems at a similar broader level, where the motivation may be seen as partly the result of *proactive* aspects of information systems, and the exposure may be seen as a result of their *reactive* aspects. However, the scope of macro theories would only be to suggest how to create a *potential* for people to seek information because these theories do not focus on what happens at micro level when this potential is realised. Consequently, these theories cannot suggest the attributes of information systems that are important for the mechanisms to unfold at micro level.

In contrast, micro theories are focused on the mechanisms at micro level, and have made several important implications. We may highlight the following:

- It is difficult to provide 'perfect data' to people,
- Straightforward request-reply loops are inadequate for fulfilling all information needs,
- Processes may be iterative, and
- There is a need for multiple channels of communication.

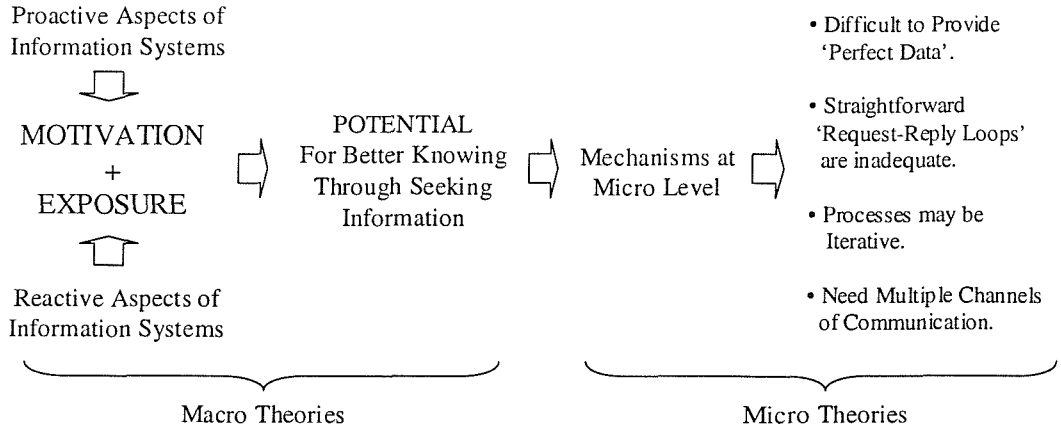

Figure 2.1 – Segregation in Existing Theoretical Perspectives

One would naturally suggest that above segregation in theoretical frameworks might be bridged by a synthesis between macro and micro theories. However, those existing

theories have been developed through different research approaches, they provide different insights into phenomena, and they place different emphasis upon organisational context. A majority of research comprises relationship studies that are either experimental or survey-based. These provide insights into abstract phenomena, but do not adequately capture their complex relationships with the organisational environment. Therefore, only limited inferences can be made about how those phenomena might be integrated into the broader context of the organisation. Because of this, there is limited scope for synthesising the existing views to obtain a coherent theory of information-seeking that describes what happens at micro level in the *natural organisational environment.* Consequently, it highlights the need for further inquiry into information-seeking within the natural organisational environment with particular attention to the mechanisms at micro level (see Table 2.1).

Table 2.1 – Scope of Existing Theoretical Frameworks

	Macro Level	**Micro Level**
	MOTIVATION + EXPOSURE ⇨	Mechanisms at Micro Level
Theories of Information-Seeking Behaviour	How people get motivated to seek information, and what channels of information they use?	
Research in Human Cognitive Processes		How people acquire information from data?
Research in Information Systems	How to expose people to information resources?	How to present data to people?
Theories of Media-Richness	Why it is importance to select media with appropriate richness? →	
Need to Investigate	*What goes on at micro level when people try to fulfil information needs within their natural organisational environment? What can be done at macro level to influence it?*	

This chapter is concluded by highlighting the need for theory to be developed from the natural organisation itself, grounded on people's interpretations of how they fulfil their information needs in that environment.

Chapter 3

Research Methodology

3.0 Introduction

This chapter describes the methodology adopted in this research to achieve the objectives highlighted in Chapter 1 (section 1.3). The first section of this chapter describes the *research approach* by presenting arguments for its suitability in this particular project. The arguments concern the adopting of interpretivism as the philosophical basis for the inquiry, and for using Grounded Theory techniques for analysing the data. The second section describes the flow of the research project by giving chronological order of key events. The third section describes the data collection techniques used in this project. It draws attention to the design of the research, selection of research sites and the approach made in planning and conducting interviews to collect data. The final section describes methods adopted in analysing the data and drawing conclusions.

3.1 Research Approach

3.1.1 Interpretivism as Inquiry Paradigm

This research does not aim to produce a 'grand theory'. Its fundamental aim is to *expose phenomena* and to provide context-based descriptions and explanations of these phenomena, which might lead to a theory that is *substantive* within the context being researched. Thus, it is important that phenomena are inquired with their contextual aspects, which is one reason for using a qualitative approach in this research. Because a theory is to be valid within a context, it has to be qualitatively grounded (Strauss and Corbin, 1998, 1990; Glaser and Strauss, 1967). Confined by this pre-requisite, the philosophical basis of its inquiry can be described as follows.

Every research method is drawn from an ontological and an epistemological assumption. These are not independent, but hierarchically constrained to define an *inquiry paradigm* (Guba and Lincoln, 1994).

Our first fundamental premise is that the reality of the information-seeking function may not reflect clearly in people's explicit behaviours. This is grounded on two important assumptions. Firstly, we suggest that people's motivation to seek information as well as their subsequent fulfilment are subjectively determined, which may not always have clear objective manifestations within natural organisational environment because people often live with limitations in both time and resources. Secondly, we suggest that the organisational context influence people's behaviour through their subjective interpretations where people's knowledge and experience playing a vital role. Hence, we argue this inquiry takes the ontological stance of a socially constructed reality (Guba and Lincoln, 1994).

Thus, constrained by the above ontological assumption, the epistemological assumption is that phenomena cannot be observed objectively, but can only be revealed through a transactional and subjectivist approach where the phenomena are *'literally created'* between the object and researcher (Guba and Lincoln, 1994). It follows that phenomena are described through a dialectical process that is subjective to interpretations by both the object and researcher. Thus, taking the ontological

stance of a socially-constructed reality, the phenomena that can be described through this research are those *interpreted* by people, and resolved dialectically between people and researcher.

Our second fundamental premise is that phenomena associated with information-seeking are unknown and needed to be exposed, but they are too complex to be hypothesised. Here we look at information-seeking from an information systems perspective, and ground it on interpretive approaches to research (e.g. Walsham, 1993; Boland, 1991) that view information systems as social systems where variables and relationships are too complex to be defined. Thus, we suggest it is difficult to describe phenomena through rational deductive techniques. Importantly, we are not suggesting that human behaviour is far from rational within phenomena associated with information-seeking. Instead, we are only suggesting that it is imprecise to assume rationality within those unknown phenomena.

Hence, confined by above assumptions, we suggest this investigation should employ inductive research methods to *discover* phenomena from people's interpretation of the reality of their information-seeking function.

3.1.2 Use of Grounded Theory Techniques

This research used Grounded Theory *techniques* (e.g. Rennie, 1998; Strauss and Corbin, 1998, 1990; Glaser, 1978; Glaser and Strauss, 1967) as the means of analysing qualitative data. Grounded Theory has been used widely in contextual research (e.g. Kendall, 1999; Lowe, 1998; Orlikowski, 1993; Pettigrew, 1990; Martin and Turner, 1986), and it has been described as letting the researcher *develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations or data'* (Martin and Turner, 1986).

However, the selection of Grounded Theory techniques followed an investigation of several other alternative research techniques that were available as viable options within the interpretive paradigm that we justified previously. Our repertoire included (1) action research in real organisations, (2) ethnographic research in real

organisations, (3) case study research in real organisations, and (4) applying general hermeneutical techniques on secondary data. We excluded the possibilities of carrying out both action research and ethnographic research because of the limitations in access to and participation by the participating organisations. As this research was to be carried out over a period of about one year, the organisations could not guarantee to maintain the same degree of access, and hence they did not wish to make formal commitments. We also excluded the need for a general hermeneutical approach because we had received access to organisations that was sufficient enough for collecting primary data. Thus, our justification of using Grounded Theory techniques is as follows:

Firstly, this research takes the fundamental stance that phenomena are *unknown*, which needed to be exposed, and Grounded Theory provided an *inductive* research method for abstracting from qualitative data to support the *discovery* of phenomena.

Secondly, this research sought, in particular, to understand the context-dependence of people's information-seeking function, and Grounded Theory techniques allowed the exploration of complexities of organisational context and the development of process-oriented theory incorporating *changing contexts*. It takes into account the fact that '*action/interaction evolves or can change in response to shifts in the context. In turn, action/interaction can bring about changes in the context...*' (Strauss and Corbin, 1998).

Thirdly, this research investigated scattered experience of people in two organisations, which were nevertheless focused around the central theme of information-seeking for decision-making. These inquiries however did not investigate specific events at participating organisations that we expected to converge into *case studies*. Therefore, in the context of such inquiry, Grounded Theory techniques provided a systematic means of abstracting concepts that related to broader phenomena from these scattered experiences.

This research may not however be categorised as a *'Grounded Theory study'* that follows precisely the doctrines as suggested originally by Glaser and Strauss (1967) or its subsequent deviations suggested by Strauss and Corbin (1998, 1990). Having said

that, this research has more resemblance with the process suggested by Glaser and Strauss (1967) than with that by Strauss and Corbin (1998, 1990). The reason for this approach (or the deviation) can be justified with reference to the pattern of evolution of this research that followed the *emergence* of perspectives at several interim stages.

The Grounded Theory process can be briefly described in the following manner. Firstly, the process begins with collecting data through interviewing selected people. Secondly, the textual data resulting from these interviews is 'opened up' by a process named *open coding* to expose and categorise various concepts that exist mostly implicitly in the text. Thirdly, these concepts are reconstituted by a process known as *selective coding* to expose *broader phenomena* that are implicit in the data, which is described by the authors of Grounded Theory as the understanding of 'what is going on'.

It is important to highlight that the above process is not sequential, as it appears, but essentially iterative from the first interview until the emergence of final perspectives. It has been suggested that this process ought to be a *systematic inquiry* into phenomena where the interview data directing the analysis, and in turn the analysis directing the interviews. Therefore, the data collection has to be carried out incrementally by selecting people as it progresses, and data analysis carried out concurrently. Selection of people for interviewing is seen as an important aspect of the enrichment of theoretical perspectives because theory develops through so called inductive-deductive loops. It means, perspectives that emerge from a set of empirical data transcends through systematic thinking, which then has to be justified by grounding once again on empirical data, and for which the researcher has to interview people who might offer the required variation. This approach to selecting interviewees is known as 'theoretical sampling'. Hence, a Grounded Theory research evolves through theoretical sampling until it reaches 'theoretical saturation' within the context being investigated.

However, the above being the essence of Grounded Theory, there are two different perspectives about how to approach it pragmatically. These differences concern the process of reconstitution of concepts, or the selective coding. The originally proposed Grounded Theory process (Glaser, 1978; Glaser and Strauss, 1967) suggests that

researcher should depend on *emergence* for understanding broader phenomena that are implied by concepts abstracted from data. However, the unstructured nature of this approach has been addressed by it subsequent variation (Strauss and Corbin, 1998, 1990), which suggests that above process can be structured by an intermediate step known as *axial coding*. This intermediate step suggests producing a matrix that categorises and interrelates concepts according to *conditions*, *actions/interactions* and *consequences*. Strauss and Corbin have suggested this matrix, which was known as the 'paradigm model' (Strauss and Corbin 1990), can provide a basis, and effectively underpin the emergence of broader phenomena.

However, there had been some critical views about the above latter approach (e.g. Kendall, 1999; Lowe, 1998; Rennie, 1998). These have suggested that, on the one hand, axial coding might have the potential to confine researcher's thinking process so that it might reduce the scope of emergence from data. But, on the other hand, they have suggested axial coding can offer more descriptive power regarding those phenomena that emerge. On the contrary, critiques (e.g. Kendall, 1999) have suggested that a Glaserian approach (e.g. Glaser, 1978; Glaser and Strauss, 1967) would provide more scope for emergence, but those emerged phenomena might require further enrichment through subsequent development of paradigm models.

Thus, in the light of the above critiques, this research project intended using a Glaserian approach in the application of Grounded Theory techniques. It used the technique of open coding explicitly to expose and categorise concepts from textual data arising from interviews. However, it never used selective coding *explicitly* to prompt discovery, but this might have been implicit because 'findings' of this research can be described as an *evolution and an enrichment* of perspectives that emerged at fairly early stages of the inquiry process. It is important that we compare this with the research process that is generally expected in Glaserian approach. Grounded Theory describes selective coding as *'the process of integrating and refining the theory'* (Strauss and Corbin, 1998). It is described further as *'an ongoing process that occurs over time'*, and it could *'begin with the first bit of analysis and does not end until the final writing'*. Thus, selective coding may not necessarily be an explicit event in the Grounded Theory process. However, Glaser and Strauss (1967) have implied that although selective coding is an ongoing process, those perspectives

that emerge at early stages are usually the properties of more fundamental phenomena that generally emerge at latter stages of the inquiry. Thus, contrary to what is expected, this research exposed its fundamental phenomena at fairly early stages, and latter stages mainly comprised a process of enrichment. Hence, we suggest this research has deviated from a general approach to Grounded Theory in two aspects that, firstly, selective coding was mostly implicit, and secondly, the process did not develop in the generic manner.

It should be noted however that the above deviation from a general approach to Grounded Theory was not planned in this research project. Its occurrence can be ascribed to the timeframe of this inquiry. As it spread over a period of more than one year, the emergence of relatively stable perspectives at fairly early stages was inevitable, which had to be enriched by increasing the breadth of the inquiry (see Chapter 7 for further discussion).

3.2 Research Process

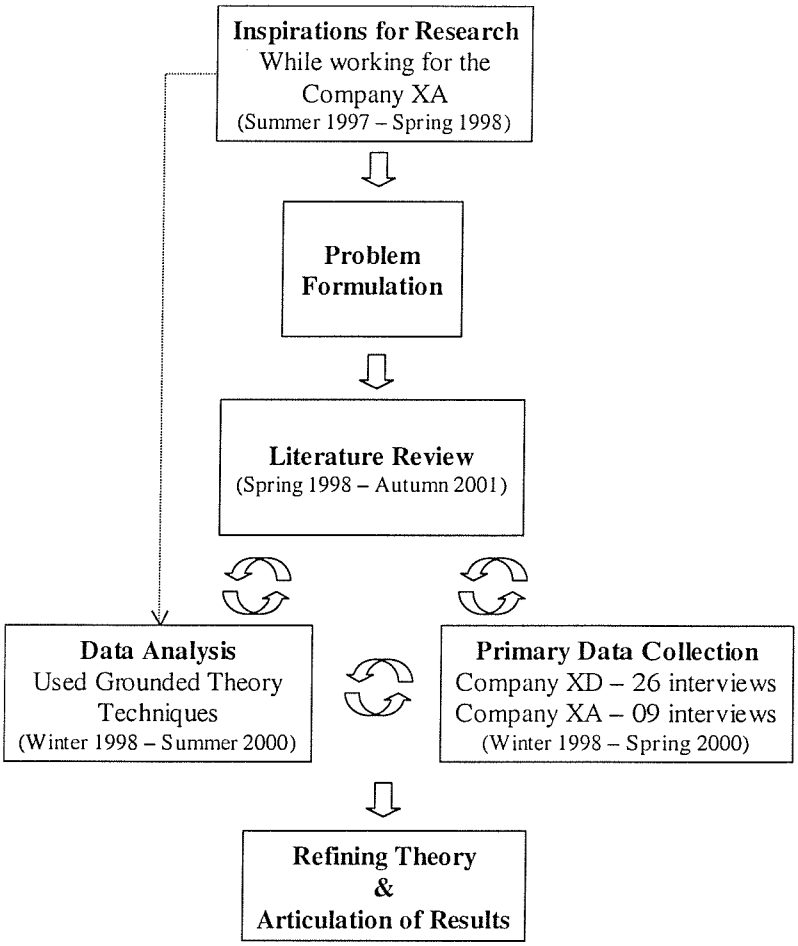

Figure 3.1 – Research Process

This research project was inspired while the researcher was working for company XA. These preliminary observations helped formulating the problem at a basic level, which however guided the researcher into the literature review. Initially, the literature review was broad and covered many areas including theory of knowledge, knowledge management and organisational learning.

One important aspect of the research process was the concurrency between data collection, data analysis and literature review. Although the initial review of literature set the context for investigation, the most relevant literature emerged during the analysis. We may state that literature review helped navigating the field investigating, and perspectives emerged in the investigation in turn directed the literature review.

3.3 Data Collection

3.3.1 Selection of Sites

The selection of sites for empirical research was directed by the concept of theoretical sampling (Strauss and Corbin, 1998, 1990; Glaser and Strauss, 1967), but affected by the accessibility and support of the organisations. As this project was inspired while the researcher was working at the company XA, it was selected as one of the research sites. This was because the researcher had access to individual members and carried first-hand knowledge about its social and cultural context.

XA is a large UK-based public company in the air transport industry. It is seen to carry a bureaucratic culture that is embedded in its size, physical dispersion and history. Its nature is dominated by the fact that communication takes place mostly through formal channels, and therefore inter-personal relationships can be described by the statement 'duties assigned by the bureaucracy' (see Chapter 5). The company is involved in a fast-changing, or dynamic industry where its clients' behaviour changes frequently requiring an immediate response from the company. However, the rate of this internal response is not equally shared by all departments. In particular, the company's strategy department, where this research was mainly carried out, was not particularly dynamic, but experienced it to a moderate level. Having said that, the strategy department, during that particular time period, was experiencing the changing structure of the company's business environment due to the emergence of the European Union.

The second company, which will be known in this report as XD, was selected to contrast with the social and cultural context represented by XA. The company XD represents the marketing arm of a large American public company, but its UK presence is relatively small with approximately 1000 employees. The important feature was that this company had recently transformed from being a rigid and a structured organisation into a flexible one with an emerging culture. Its nature can be contrasted with that of XA in the sense that informality dominates the communication channels. Inter-personal relationships can therefore be described by the statement 'friendly and obliging' (see Chapter 4).

The company XD is involved in the pharmaceutical industry, which is highly competitive, but is seen as moderately dynamic because its clients' behaviour does not change as fast as that of XA. Its average planning horizon is comparable with that of XA's strategy department. However, unlike at XA, the rate of its internal response to the business environment was almost equally shared by all departments. This was mainly due to its limited presence in the UK. A senior director of the company commented 'we are like a big family here in the UK...we are operating together'. This comment was true even regarding the culture where it was more homogeneous than that of XA.

Both XD and XA provided suitable contexts for the study of decision-makers and their information-seeking function where the contextual differences they represented were significant. These differences were found mainly in technological infrastructures, routines, nature of trust and the emergence of the informal organisation.

3.3.2 Selection of Interviewees

The scope of this inquiry was confined mainly by the willingness of people to participate from selected organisations. Prior to the inquiry, informal consent was sought from a broad spectrum of people. Our initial aim was to interview people with decision-making responsibilities at all levels of the organisation. Thus, more than 40 people were approached initially at both organisations. However, only 19 implied their willing to participate, particularly to be interviewed more than once during a period of about one year. This group mainly consisted of *middle to senior management*. It included two junior staff, but no one from the top management was willing to participate at the level required by the research. Hence, this inquiry was confined into the category that was well represented by the above group.

Out of those people who implied their consent for participation, only 12 were actually interviewed, but 5 others were added on during the process. The criteria for this selection were not pre-planned, but they emerged in the process of the inquiry. Accordingly, the selection was mainly based on shared experiences of a particular

task or those who were involved in similar kinds of work. The researcher constantly sought for different opinions and behaviours. For example, the director of the CNS therapy team at XD was one of the first people to be interviewed, and this led to interviewing only two others from the same team, despite we had received consent from four people in this team. Instead, we sought consent from another person in the NHS team who was carrying out similar work, and who represented a different approach to information-seeking. Thus, the inquiry expanded beyond the group of people that was pre-selected, but those who were added on subsequently still represented the same category of middle to senior management. Table 3.1 below shows a summary of interviews carried out at both XD and XA. See Appendix C for a complete schedule of interviews.

Table 3.1 – Summary of Interviews at XD and XA (Winter 1998 – Spring 2000)

Company	XD	XA
Total number of Interviews	26	9
Observations	-	8 months
Profile of the Interviewees		
Directors (non executive)	5	-
Senior Managers	3	3
Middle Managers	4	2

3.3.3 Interviews and Observations

The data were collected primarily through interviews, but they were supplemented to some degree by the researcher's casual observations while working at the company XA. The company XD was researched through interviews only.

The interviews were in-depth and mostly semi-structured. Each lasted for more than $1^1/_2$ hours. Approximately 70% of the interviews were followed-up, and approximately 30% were followed-up again. Building trust was a vital part of these interviews. The researcher personally knew most of the participants at XA, but the development of trust was a slow process at XD. Only one interview per day was carried out at XD, which was planned purposely to increase the number of visits to their premises. It was observed that 'seeing around and saying hello' was an

important part that made the researcher a 'semi-insider' within the company. Preliminary interviews were more structured and they often became just a series of questions and answers (See Appendix C for the structure of preliminary interviews). However, the researcher ensured that questions were properly directed. That is, even though these interviews were pre-planned, the researcher often deviated from these pre-planned questions into systematically investigating theoretical issues (Strauss and Corbin, 1998). It was observed that with increasing trust, the interviews often became less structured, and in many occasions they turned into informal discussions about a particular subject area. Sometimes the interviewees 'got carried away' even to criticise their own colleagues, routines and the company. However, the researcher ensured that sessions were indirectly manipulated to obtain useful information.

Theoretical sampling (Strauss and Corbin, 1998, 1990; Glaser and Strauss, 1967) was carried out throughout these interviews. It means that the interviewees were not selected arbitrarily. Only four people were accessed initially at XD, and the others were selected incrementally to comprise different perceptions and behaviours. The researcher used his personal contacts to select the interviewees at XA.

Interviews were carried out between the winter of 1998 and the spring of 2000. They were generally spaced thoughtfully to provide adequate time for analysis so that the investigation was systematic. As Grounded Theory requires the data analysis to be concurrent with the field study, interviews were transcribed immediately and some investigations were carried out on this text prior to the next interview. This preliminary analysis often directed the investigation to the next interview. However, the interviews sometimes fell too close to one another, and this was inevitable because the schedule was constrained by the availability of people.

3.4 Data Analysis

3.4.1 Open Coding

Interviews at XD and XA were transcribed maintaining all the dialogs that arose between the researcher and interviewees. This textual data were then interpreted following the process of open coding (Strauss and Corbin, 1998, 1990; Glaser and Strauss, 1967) to abstract implicit and explicit concepts. This process effectively employed the technique 'comparing and contrasting', which is the basis of Grounded Theory, and made constant references to the contexts in allocating the meanings to words and phrases used by people. Highlights of these interpretations were recorded in *memos* for subsequent references (see Appendix A for an abstract from field notes that demonstrates the open coding process used in this research).

An important part of this process was the categorisation of concepts. However, this proved to be rather iterative because interviewing took place during a period of about one year. It was observed that with the accumulation of data, categories needed redefining and splitting, which continuously affected the researcher's perspective of 'what is going on'. For example:

The concepts

- Incomplete information
- Incomplete jig-saw
- Fragmented view
- Incoherent information

} were initially categorised as referring to 'insufficient information'

However, with the subsequent additions of other concepts, the richness of the above category increased, hence it was split and redefined as following.

- Incomplete information
- Incomplete jig-saw
- Fragmented view
- Sufficiency of information

} 'Fragmentation of mental models'

- Incoherent information
- Latent value of information
- Trust upon the source

} 'Fuzziness in mental models'

Figure 3.2 – An Example of Redefining Categories in Open Coding

The researcher's skills in abstracting and categorising concepts as well as conducting interviews improved over the period. Hence, the 'comparing and contrasting' was

even carried into the interviewing. In particular, the interviewees were often asked what they would do (or had done) if conditions were to change, and these dialogues added to the theoretical content of the data. Such questioning helped to investigate different perspectives of emerged concepts, and often enriched defined categories by the addition of newer properties.

The Grounded Theory process is not sequential (Strauss and Corbin, 1998). The researcher could not avoid drawing conclusions from the initial stages of the inquiry process. These interim conclusions, on the one hand, directed and structured the inquiry process. But on the other hand, they sometimes influenced the researcher to narrow down the inquiry too early in the process by developing a bias. These problems were identified through discussions with fellow researchers, and ensured, as far as consciously possible, that an 'open mind' is maintained during the initial stages and allow concepts 'bloom'.

3.4.2 Selective Coding and the Emergence of the Phenomena

It was stated in section 3.1.2 above that findings of this research were an evolution and an enrichment of perspectives that emerged at early stages of the inquiry. It was also stated that this research did not use selective coding explicitly, but it was implicit in the process that took place over a long period.

From the early stages, the researcher observed the importance of variations in the nature of interactions that people adopted in their information-seeking interactions. However, reasons for these variations were seen differently at each stage of the research, which started as simple descriptions and developed later into a descriptive theory. These variations were described initially by the concepts: 'black box communication' and 'transparent communication'. The perspective was that these variations occur mainly due to time-constraints. However, this perspective evolved in subsequent stages to show that there were other important factors besides time-constraints that caused variations in interactions. These variations were then described as 'shallow interactions' and 'in-depth interactions'. They were further enriched to redefine in-depth interactions as 'exploratory interaction' with

subdivisions 'soft' and 'complex'. The comprehensiveness of the underlying theory was enriched further following the emergence of concepts 'contextualising', 'secondary information' and 'information-seeking acts'.

An important aspect of selective coding is the need for continuous validation of emerged perspectives by testing them on the data itself. A refined theory would naturally expect at least to describe 'what is going on' in the data. It was observed that perceived incompatibilities between these emergent interim perspectives and new data were fundamental stimulations for evolution of this research. Thus, the inquiry terminated at 'theoretical saturation' (Strauss and Corbin, 1998), which was pragmatically defined.

Shown in Appendix B is an example of a mini framework that shows the interlinking amongst open codes, categories and emerged phenomena. Creating such frameworks not only helped the emergence of perspectives but also guided the researcher in subsequent interviews by providing hints of what to look for.

3.5 Summary

This chapter described the methodology used in this inquiry to achieve stated objectives. Arguments were presented for adopting interpretivism as the philosophical basis of the inquiry, and for using Grounded Theory techniques for analysing field data. Furthermore, we highlighted a deviation in our inquiry from the normal process that is expected in Grounded Theory research, and suggested reasons for it.

The next two chapters (4 and 5) present field data collected through interviews at companies XD and XA. These comprise scattered experiences of several people, which are compiled to present a series of 'storylines' that are easy to read and highlight people's information-seeking function within their respective empirical contexts. These storylines are supplemented with descriptions adopted from memos produced in the open coding to highlight concepts and phenomena relating to people's behaviours.

Chapter 6 that follows will examine and interrelate concepts that emerge from field data at a more abstract level to develop theoretical perspectives of the information-seeking function.

Chapter 4

Information-Seeking Behaviours of Decision-Makers at the Organisation XD

4.0 Introduction

The objective of this chapter and the next chapter is to highlight the attributes and variations of people's information-seeking function through descriptions compiled from interviews and observations carried out at the organisations XD and XA. Textual data that resulted from these interviews were examined and raised to conceptual level through a process of open coding as described in the previous chapter. These concepts led to the emergence of several phenomena relating to information-seeking function, and it is the aim of these two chapters to highlight them in their appropriate empirical context. Chapter 6 will look at these concepts, phenomena and their interrelationships at a more abstract level to develop theoretical perspectives of people's information-seeking function and its contextual dependence.

In Chapter 4, we look at how the phenomena that emerged from Grounded Theory analysis relate to people and their environment at XD, and highlight the attributes of people's behaviour that optimised their information-seeking efforts. These descriptions point out that *variation in people's interactions* with information sources is a key manifestation of their information-seeking behaviour. In Chapter 5 that follows, we look at these phenomena within the contrasting context of the organisation XA.

The company XD is seen as newly transformed from a rigid and structured organisation into a comparatively flexible one where employees can effectively compare the differences between the two eras. The most important feature of this cultural transformation is that it has liberalised inter-departmental communications.

Hence, the domains of the free-flow of information have expanded, and the flow of information is governed by the attitude: 'friendly and obliging'.

This chapter begins with an introduction to the company and its culture. It then describes the information-seeking activities of several people within *Customer Business Units* and *Therapy Teams*. Attention is given particularly to the interplay between personality factors and environmental factors that created unique contexts for each person's information-seeking activities. Following from that, it describes the activities of two support functions: *Business Intelligence Unit* and *Business Information Group*, and how they have taken part in people's information-seeking activities.

It should be noticed that, although twelve people were interviewed at XD, we focused only on eight of them when compiling our discussions in this chapter. The reason for this exclusion was mainly to avoid repetition of experiences because our aim was to highlight variations in the information-seeking function, but not to justify phenomena through quantification of their occurrences. Thus, in compiling discussions, we avoided bringing new characters in just to repeat facts, or to highlight a single minor fact, because the process that was required to merge these characters into the context often disturbed the flow of the discussion. One criterion for the inclusion of people thus naturally became the degree of contribution from their interview texts towards the emergence of fundamental phenomena and their variations.

This chapter ends with a summary of key observations made in relation to XD, which forms a basis for conceptual frameworks developed in Chapter 6.

4.1 About the Company XD

Company XD represents the prescription drugs arm of a large American public company in the pharmaceutical industry. The company has a long history, being established in 1866, and acquired by its parent company in 1970. The company is predominantly based in the USA where it earns 80% of its profits, and its UK subsidiary represents one of its strongest operations outside the USA. In 1999, the parent company was ranked within the top ten of the largest pharmaceutical companies in the world.

The company's UK head office is located in the south of England, which mainly represents the marketing arm of the organisation. Its scientific research facilities are predominantly based in the USA, but a small percentage of research is carried out at various locations worldwide. The research facilities in East Anglia, UK are managed by the company's New Jersey headquarters. However, because of the strong international legal framework that governs the pharmaceutical industry, the company has to carry out some of its clinical trials within the UK in accordance with specific guidelines set out for that purpose. These trials are managed by the UK subsidiary.

4.1.1 'Farewell to Bureaucracy'

During the mid nineties, the parent company of XD suffered a severe downturn. At certain times the company had been under take-over threats from competitors. However, the recovery came through a single cardiovascular product that hit the market worldwide approximately four years ago. Even to date (1999) it remains the company's prime brand producing the highest income. Since recovery, the company has shown a steady growth.

The recovery was followed by a structural change within the UK organisation. The objective of this change was stated 'to transform the company into a flexible organisation that could survive through the competitive threats anticipated in the future'. The staff at UK head office ascribe these changes purely to the proactive

attitude of their new vice president. As a result of these structural changes, the company's hierarchy has become shallow where it is now a conglomeration of self-contained teams. This means that in addition to carrying out their main function, each team is responsible for carrying out part of the support functions such as human resource management and information management. The philosophy behind this approach was described as follows: 'in this way, the support divisions like Personnel and Business Intelligence can help the teams with a better understanding of their needs'. The main teams currently in operation are:

- *Customer Business Units* (CBU) – These are sales functions which form the interface between the company and its client-base. The company operates through three CBUs: South, Midlands and North.
- *Therapy Teams* – These are the central strategy-making bodies that formulate competitive strategies for the company's products. Currently, there are three therapy teams covering all of the company's products.
- *Business Intelligence Unit (BIU)* and *Business Information Group (BIG)* – They are the centralised information providers.
- *Head Office Marketing Team* - This is the central marketing function which formulates marketing strategies at national level.
- *Clinical Trials Group* - Manages the clinical trials.
- *Personnel Department* - Manages the human resources.

4.1.2 Organisational Culture

XD employs around 1000 personnel in the UK, of which approximately 70% are based at its head office. The head office is located within a single building in the South of England, which is shared with the parent company's Consumer Healthcare division (managed as a separate company). This accommodation comprises modern office space with luxury fixtures and fittings that give the employees a feeling of quality in their physical surrounding. The offices have been arranged mainly in open-plan layout with a generous amount of work space for each person. The directors and senior managers occupy enclosed offices, which are nevertheless separated by glass panels with semitransparent blinds on the inside. Many employees voluntarily

commented 'this is a nice place to work', by which they referred not only to the physical space.

The company maintains an informal policy to keep the doors open in offices, except in the case of important meetings. This policy has improved the informal relationships between senior and junior management where the junior staff are not reluctant to knock on the door of their seniors. Andrew, the director of a Customer Business Unit made the following comment about his experience:

> 'When I came to work in the office three years ago as the director of this unit, I was not comfortable with the set up. I wanted a closed room with more privacy, but now I can appreciate this more than anybody, because I think I have produced a fine team here which needs my help more than my authority'.

The core of the organisation comprised Customer Business Units and Therapy Teams, and the other teams perform very much a supporting role. The fluidity of inter-team communication has been highly emphasised by the new vice president, which is reflected even in the seating plans of team members. The layout has been arranged to encourage communication amongst members of different teams, and those well-defined communication channels of the bureaucratic era are now in the process of disappearing.

One of the significant recent changes is the move towards wearing casual clothing at work, at the initiative of the new vice president. Its objective was to diminish the hierarchy even further, but the effects have gone beyond that, where people have begun to appreciate the comfort with casual clothing. Andrew commented,

> 'It is almost a different organisation now. I think people have better opportunities to do their job properly....'

4.2 Decision-Making in Customer Business Units (CBUs)

Customer Business Units represent the company's interface with its client-base. These units comprise a team of field-based sales personnel and a team of head office representatives, all headed by the director of the CBU. The following introductory comment was given by the director of one of the CBUs.

> 'We are not just a sales unit, we have sales, marketing, medical, human resource, all of that within the unit. Although it is mainly salespeople in it, it is not just a sales function. It is almost like a mini company within the company....'

The reason for having this sort of organisation within a CBU is that it operates on a very local basis, where each locality forms a unique context. While the field sales team forms the interface between company and its client-base, the head office team forms the interface between the local context and the company's centrally-developed strategies. For example, in answering the question 'why does the CBU hold medical personnel?', the director commented that,

> 'When you are looking at things [on a] more local basis, you get many more people you need to know through local opinion leaders. Therefore, to be able to understand and truly know the opinion leaders in your locality we need medical personnel situated within the CBU'.

The head office personnel of a CBU are 'strategy brokers' who carry out a dual function of implementing centrally developed strategies within its local context and in return enriching those central strategies by feeding back the strategic ideas emerged from the local context. In effect, decision-making within CBUs is directed by two forms of information: what is going on centrally within the company and what is going on locally. For example, all the strategies for the company's brands are developed centrally, but implemented locally. Thus, all the decision-making regarding, say, the promotional work on a particular brand will be based on inputs from both the central body and local representatives. Such implementation decisions

have to be made regularly by CBUs as a reaction to the changes both in the business environment and within the company itself.

> 'We make too many decisions, things change every week now. Somebody phones you and says, so and so is not using our products any more, or competitors have allocated more staff in our area, or it could be many other things....and we react to this information and have to make [the] right decisions all the time'.

Not only these, the CBUs are pressured by the sales targets imposed by the central body. The actual sales figures are monitored against these set targets and appropriate strategy changes are carried out as regularly as every two weeks. Decision-making is driven by queries such as *'how to balance the product portfolio'* that lead to queries such as *'what products should receive higher promotional expenses/activities'*, and *'how to maintain/improve the client-base'* that leads to *'which clients should be approached and by whom'*. These decisions are made by various personnel within the head office staff, some collectively and some individually. The collective decision-making often reduces to the individual level where collective sessions are seen to be for the purpose of *sharing knowledge* rather than for *deciding*. In just a few instances the decisions are arrived at by voting for the alternatives, but this again is only a selection technique that follows individual decision-making.

> '....the culture here is that decisions are made inside little rooms, not in the conference hall. But we have lots of meetings, talk about things, and then go away and decide....There is nothing wrong in it as long as everybody is informed....We are good in that, the decisions are published, you definitely get the e-mail if you happened to be in the meeting'

4.2.1 Information-Seeking by Louise for a Routine Sales Forecast

The director of a CBU has to make a decision every two weeks on a monthly sales forecast, which is published company-wide. Sales forecasts are important because the CBU plans its activity schedule primarily through a comparison between targeted and

forecast sales. Also, the sales forecast becomes the input to a series of other decisions outside the CBU. These forecasts have to be compiled from the latest available information, therefore it has become a time-constrained task. The process of formulating a forecast begins from current actual sales figures, which are then adjusted for things like promotional activities, client behaviour and competitor behaviour in its respective locality. The directors can obtain the required information explicitly from sophisticated databases that are purchased by the company, but the problem is that these databases cater only for company's main brands. Therefore, directors use field sales personnel as an important source of information because of their close association with the company's clients as well as other relevant activities in their region.

The normal practice within CBUs is for the sales personnel to send estimated figures of either increases or decreases in sales for the products they handle within their regional territory. They send these figures through electronic mail to the unit director every other week, often with a brief note about any significant event that he/she may perceive as important. The following comment was made by Louise, the director of the southern area CBU regarding this routine task of acquiring knowledge from field sales personnel:

> 'I never get more than half the responses I expect to get. You can't blame the sales staff for this, they are in a different environment, [have a] completely different mind-set and they forget most of the time. So if whatever the stuff [information] I receive make sense, then I go ahead with it.....Not everybody can do it in that way, I know some people who are reluctant even with 80% responses. There is a good [significant] personal element involved in this.'

Louise follows a very informal and friendly style of management with very little imposed conditions on her staff. Even responding to standard requests like the one above are not considered as compulsory, rather treated as part of the individual's responsibility to the organisation. Because of this attitude, sales personnel try their best to meet her requests, but they also tend to ignore these in difficult situations without much guilt. However, over time, Louise has informally nominated a few

'favourites' amongst her staff whose opinions receive a higher weighting when it comes to decision-making.

In her above comment, Louise used the phrase 'make sense' instead of saying 'understand', which she used to imply that the knowledge she gained was not explicit. For Louise, 'make sense' meant 'coherence' and 'incompleteness' simultaneously with reference to the information, but she described this state as 'comfortable enough' to make a decision. Therefore, Louise's understanding may be described as a *fragmentation,* and its degree was not too severe in the above occasion to obstruct the decision. In contrast, a high level of fragmentation in a person's understanding *may not be comfortable enough* to proceed with a decision. In answering the question 'would you be more comfortable with 80% responses?', Louise said 'it depends', which implied that she did not allocate equal weighting to all the information. That is, even with a high level of responses, the understanding that Louise develops may still be significantly fragmented if she did not receive the 'right kind of information'.

Each month, the sales staff is allocated a certain level of activity, which Louise described as 'what they can reasonably achieve'. These activities have only a limited impact on the short-term variations in sales because they are for maintaining the market-share in the long-term, and described as 'topping-up the contacts'. However, they can incur short-term influence in the case of successful acquisition of a client against a competitor, but still the representatives can only guess the success of such cases. What contributes mostly to short-term variations are the activities of health authorities in the region. The field representatives learn details about these to varying degrees, even among those who work within the same region. However, in their reporting to the unit director, the sales staff attempt to compete with one another by sending 'smart' information. These often cause Louise confusion in the context of preparing the sales forecast, and she declares them as 'not making sense'. In the subsequent part of the conversation Louise commented on what she does when the information does not make sense:

> 'I try to ask a few site people [sales personnel]. I have few key people whom I know very well, and I ask them what is going on....It is not good when

> information tells you something else, not what you expected. I have been in this business for so long, and I have the 'gut feeling' of what is happening, but still you can't ignore the information....I have a respect for these guys....'

Here, Louise faced the situation where she could not ignore the data just because the information it produced was not coherent with her own opinion. The reason was that she attributed some hidden value to it based on the trust she placed upon its source. In fact, she assumed that the problem could be in her interpretation of the data rather than with the data itself. Therefore, the result of such simultaneous occurrences of the *incoherence* and the *trust* points at another phenomenon that exists in duality with fragmentation, and it may be known as the *fuzziness* in understanding. Louise encountered fuzziness because she perceived that the data contain some useful information even though she could not see it.

Louise has over sixteen years' experience in the pharmaceutical industry, and seven years with XD. Before becoming the director of the unit she worked as its marketing manager. She therefore carries a good insight into the activities within her locality. Also, she has other sources of information, both internal and external that inform her about various activities that take place there. Louise therefore claims she could produce a reasonable sales forecast without consulting the site sales personnel. Here she expects the information received from sales personnel to verify her own views. Therefore, the meaning of 'make sense' in this context refers to the coherence of received information with her own views rather than the information creating its own view.

However, despite what Louise perceived as 'making sense', the opinions of sales personnel sometimes coherently created their own view that challenged her independent opinion. But, Louise accepted that she had often overlooked this alternative view because of her bias towards her own opinion. This was a main reason for causing the fuzziness in her understanding. She described her interaction with this information as 'trying to find what she wanted' rather than 'trying to find what it contained'. In answering the question 'how do you come to know your error?', Louise said:

> 'Sometimes it comes to you automatically, or it comes when you talk to a sales guy. It all depends on the information. When things are not clear, and you have only this much of time [limited time], you don't want to take the risk just going up and down the same information again....I mean, if there is someone you could approach, you will do that....'

As a result of these detailed interactions, the situations have often begun to make sense again. Yet, in answering the question 'why don't you get the sales personnel to phone you with their information?', Louise commented:

> 'Yes, it is nice to get this information over the phone, so I could at least ask a few questions and know what is going on. That is sharing knowledge....but, that is not very important, I know what is going on most of the time....only in a confusion I need to phone, then I wouldn't waste time just thinking over the information....but, still I wouldn't try to phone everybody'

However, there had been certain situations where Louise had proactively acquired information from her favourites over the telephone and completely ignored the opinions of the others. She described the reason as 'I was losing grip.... and didn't have time for confusion'. In fact, Louise was 'losing grip' of her own opinion about the forecast even before receiving any information from sales personnel. She ascribed the cause to the new communication culture that was emerging within the organisation where the dissemination of information is becoming increasingly proactive. In particular, she referred to a new 'meeting culture' that has become common place, which has the characteristics that they are short, formal (but no minutes are taken) and ad-hoc.

> 'You can't hold your opinions for too long now....its good, I am not complaining, but sometimes you feel its too fast, and you need some space to think, just lay back and think....and, that is exactly what I don't get'.

Louise did not lose control of her opinions that often, which is mainly attributable to her experience and her dynamic behaviour. However, she sometimes lost control

completely with the information sent by site personnel when it neither supported nor challenged her opinion.

> 'There are times when information is really foggy, don't tell you anything.....ideally I should check with each and every person on site, but that'll go on for ever. So, I go by the figures given by few people, I have a good regard for them [she showed a picture of one of them in a rowing team]. Sometimes it doesn't work, but that is the best we can do, we don't have awful lots of time for this clarification work'

Louise interprets a particular situation as 'sufficient information' when the views of sales personnel either coherently verifies or coherently challenges her own view, despite the fact that she may have received only half the expected responses. She described these situations as '...incomplete data, but still sufficient....'. In other words, she accepts that level of fragmentation in her understanding. However, it was found that the word 'sufficient' does not refer just to the coherence of information alone, but also to the personalities behind those received responses. Louise always allocated a higher weighting to her favourites, or to the opinion leaders.

> '....you tend to learn how to value each person's opinion. Whenever, I get some numbers or any other information, I always check who [has] sent them. There are a few guys I always like to see providing this information, and I am a bit reluctant...ummm...say I am less confident if some of these people are missing. The information may be perfect, exactly what I wanted, but.....it is like a jigsaw with pieces missing. That is a good example, in fact we are putting together jigsaws, and that is what decision-making is. You get your jigsaw sorted then it is a fairly easy job'

This concept of the 'jigsaw' may be rephrased to state that it is *a jigsaw with large and small pieces* where her favourites occupied the larger pieces. The loss of a large piece can cause serious fragmentation while the loss of a small piece may not. In fact, Louise commented that most of her decision-making is based on fragmented jigsaws, but she feels comfortable as long as they give a 'sense' of what the picture is. From this aspect, the 'sufficiency of information' refers to the coherence of information and

the trust upon the source, more than to the volume of information. Accordingly, the *fuzziness* could occur when the opinions, particularly that of opinion leaders, do not fit in with the jigsaw.

4.2.2 Key Aspects of Louise's Information-Seeking Behaviour

Louise's information-seeking behaviour carried some key features. Her interactions with the sales staff had been influenced significantly by the fact that she perceived to carry reasonable knowledge about the activities of her sales region. Louise is familiar with various systems operating within her sales environment because she *associates them commonly* in her activities, and therefore she perceived to know their behaviours to a reasonable degree. Louise used the phrase 'sales formulae' to describe cause-and-effect relationships in her environment where the parameters of these formulae include clients' behaviour, competitors' behaviour and the company's strategies. However, despite carrying this pre-knowledge, Louise was still seen to have sought information from sales staff in preparing the sales forecast. This was mainly for the purpose of clarifying her own opinions, because she was aware that the activities of various players in her sales environment would change in the short-term, and that she could not 'keep track' of all such change. However, Louise did not usually expect these activities to change her 'sales formulae' turbulently in the short-term, and therefore such change in systems can be described as 'soft'. Because Louise expected soft change in her environment, she was often seen to have adopted only *brief interactions* with the sales staff in acquiring data where, in many occasions, she was motivated only to collect the data that were sent to her through electronic mail.

At the same time, Louise's above inclination to adopt brief interactions with her sales staff can be ascribed to her clear understanding of *how to use the data* that she *expected* to receive from the sales staff to support her decisions. This was not only because she was familiar with the activities in her sales environment, but also because she was familiar with the kind of data sent by the sales staff with which she had previous experience. Louise knew the structure of this data and the references made in them. In other words, Louise knew, at least implicitly, how this data can be related

to the problem in focus or to the specific task of decision-making. Therefore, it may be said that Louise had 'contextualised' the data by *perceiving to understand how to interpret* it within the context of the problem in focus. It was seen that contextualising had *confined the interpretations* of the data so that the emerged information was directed efficiently at the problem.

It is important to understand that 'contextualising' is a phenomenon that is 'problem focused', thus, although Louise was familiar with the data, she would not have known how to use the same data in the context of a different problem. In the case above, Louise saw that acquiring the data through brief interactions with the sales staff would provide her with adequate information because she was assumed to have contextualised this data even before the actual interaction.

But, Louise knew that brief interactions were not always adequate to acquire the right kind of information. She sometimes realised on receiving the data that the changes in her sales environment were not as soft as she perceived, but rather *complex* and carried a significant degree of turbulence. Therefore, on such occasions, Louise was seen to have requested detailed interactions with the sales staff, particularly with her favourites. It was observed that the purpose of these detailed interactions was mainly to *re-contextualise the data* because the default contextualising that she *assumed* through her pre-knowledge was now in doubt. It is important to notice that Louise purposely avoided trial-and-error because of time-constraints, and therefore contextualising can be seen as a proactive process against it.

Thus, it can be seen clearly that Louise's information-needs had expanded following the receipt of the data. But, some of this additional information did not have direct value in the context of the problem. The purpose of this additional information was to facilitate contextualising, which reduced the opaqueness in the relationship between the data and the problem. Opaqueness may be viewed as an *auxiliary problem* in the context of solving the primary problem, hence the related information may be known as *secondary information.* Although Louise searched for secondary information through a separate act in the above case, it became an integral part of her broader act of information-seeking.

A prominent aspect of the search for this secondary information was its *timing of acquisition.* It was seen that in a majority of instances Louise did not emphasise secondary information at the time she acquired the data from the sales staff. The main reason for this was the confidence she had in her pre-knowledge that served the initial basis for the contextualising. It was only following the perceived inadequacy of this pre-knowledge that she emphasised inquiring from external sources, mainly from her favourite staff, where the interactions became exploratory. However, in contrast to these majority situations, Louise sometimes acquired the data proactively from her favourites and ignored the responses from the others. In this latter case, Louise knew that her pre-knowledge was inadequate even before the receipt of the data, hence she adopted detailed interactions from the outset. These interactions may be known as *complex explorations* because it encompassed both the acquisition of the data and also contextualising it through the acquisition of secondary information. Thus, in contrast to this, acquiring secondary information in a separate act may be known as *soft explorations.*

Louise implied that a main reason for the lack of secondary information was the perceived resistance between the office-based staff and the field-based staff. This appeared to have taken the form of a cultural conflict where the field sales staff at XD were regarded as belonging to a different culture than those who were office-based, even though they were part of the same team. Louise, being the director of the unit has always tried to maintain good relationships, but sales staff often *assumed* power because of their relationships with clients. This was Louise's main justification for having favourites amongst the sales staff.

> 'I can get them fairly easily on their mobiles, but as the director I don't want to become too much of a nuisance, phoning every other week to discuss numbers. I know how people talk about these things. I rely on e-mail, and hope for quick replies. These people do a good job on site, so we don't want to put any conditions [which] they don't consider important.'

The significance of this comment resides in the fact that it was made by the director of the unit where, in normal circumstances, one may assume to have the highest concentration of power. In a subsequent comment Louise said:

> 'What sales people want is to get their efforts published more than to supply information for our work here. [The] main reason I see is they don't experience this environment, so don't see the importance of all this other stuff we do here....their view is, if the selling is sorted then everything is OK.....'

4.2.3 Information-Seeking by Simon in Non-Routine Tasks

The CBU marketing manager Simon shared similar views with Louise about acquiring knowledge from field staff. He implied that such lack of commitment from them could find its links to the absence of rewards where a sales person would not 'perceive it as important'. Simon commented that:

> 'sales people are part of our team, an important part of the unit, but they think like independent people, or freelance people. I think that is because they work in a completely different place. Here we meet the same people every day, we have lunch together, I go knocking on doors....so we feel together and obliging to help. It is difficult to have the same with site people'.

However, sales forecasting is not the only occasion where field staff contribute to decision-making. There are other numerous occasions where they are requested to provide opinions to the head office staff, which can be much more descriptive in nature than a sales forecast. These often comprise detailed information about the activities of specific clients. The marketing manager Simon referred to a special promotional campaign that was carried out by the CBU in the South East of England a few months ago. This comprised a half-day educational/informational seminar on the latest medical research and on the company's current and future products, which was facilitated by reputed industry speakers. The campaign was carried out in nine locations in the region within a period of about four weeks. The significance of this

event was that it followed a sudden decision by the central marketing division as a reaction to a forthcoming product launch by one of XD's competitors. As a result, Simon had only sixteen days to organise the event. Simon had to make several decisions, most importantly, to decide which clients to invite, which speakers to chose and how to structure the event at each of these locations. One main reason to have several sessions was to differentiate among clients, which the company has informally classified according to behaviours and attitudes. In this case, the main source of information was field sales personnel.

> 'This type of promotion can be a winner, but sometimes they can be your worst enemy. There are lots of ethical issues involved here and you have to address them carefully. With some people you need to have the salesman approach, some people prefer the caring sort of tone and there are some who just want the information, they otherwise think you are trying to bullshit them'.

A prominent difference between Simon's experience above and those routine forecast decisions made by Louise was that, in this particular event, Simon had to deal with some newer aspects of his sales environment of which he carried only a limited understanding. Therefore, Simon's objective was to *construct his understanding* of the behaviours of the systems, whereas Louise's objectives were mainly to *bridge the incompatibilities* in her *well developed* knowledge. Consequently, Simon's information-seeking behaviour reflected this difference. In particular, Simon knew the inadequacy of his pre-knowledge in these promotional campaigns from the outset, and therefore his emphasis was not only on acquiring primary data but also on acquiring secondary information. Furthermore, his extreme time-consciousness at that particular time forced him to merge these two activities, that is to obtain the secondary information over the same interaction that provided the primary data. As a result of these, Simon decided to have face-to-face meetings with the sales staff, and rejected using electronic mail and the telephone to obtain this information.

> 'I met three sales guys in a service station, and we sat in the coffee shop and discussed. That was very successful, I told them our plans, they told me about people, actually in less than two hours I knew who should give the talks, how it

should function, all those things. It saved me lots of time regardless of [the fact that] I travelled to Eastbourne for this'.

Furthermore, in answering the question 'why couldn't you use the telephone?', Simon commented that:

'It wasn't just talking, they had to show me a few tables, some photographs, in fact they had loads of things in their briefcases, and when something comes up they just pick a thing. You can't do that over the telephone....main thing I saw there was that they didn't know what I wanted exactly... even I didn't know precisely what I wanted, but I had some idea....things come up in the talk, and you think ah!! that is great, why not do that....what [usually] happens is [that] you go to a meeting with a rough idea about what you want, and then you make the others fill the voids...'

Despite what occurred in the above event, electronic mail and the telephone are major parts of Simon's life. A fair percentage of his decisions can be made using only these facilities. Simon's view was that 'telephone and e-mail have their use, but most of the time that is all we have'. By this exaggerated comment he implied that telephone and electronic mail are being used beyond their effectiveness.

'Two days ago I had to make a decision on some promotional material. I got the information easily on e-mail, because I knew exactly what was going on, there was no confusion. But, sometimes it is not straightforward, e-mail [is] not good enough and I need to talk to a sales guy. But he is busy and asks you to send an e-mail....now most of the time his reply is not the perfect answer, but you have to use it somehow because [there is] no time to send any more e-mail'.

What Simon preferred here was to obtain information from the sales person in a short but detailed interaction so that the data could be used efficiently to construct an understanding. He perceived that electronic mail was inadequate because he was not in a state to raise a sufficiently clear question to receive a straightforward answer. By this, Simon implied that electronic mail is appropriate when the *question is clear*, that is, when he knows 'what is going on'. He commented that 'you can ask clear

questions only if your mind is clear, and that depends on what the other information has done inside you'. He referred to one particular event where a memo from one of the therapy teams caused confusion by suggesting a substantial increase in promotional activities on a particular brand. This resulted in Simon having to replace a few regular electronic mail communications with physical visits to offices. The main reason for this, he explained, 'there were lots of questions and answers, that is interaction....e-mail takes ages, and you might still not get the answer'.

Simon's experiences indicated that he was clearly aware of the incompleteness in his knowledge from the outset of his information-seeking interactions. Because of this, Simon was seen to have attributed only little value into receiving the data without having the adequate channels to acquire the secondary information. Consequently, Simon emphasised not only the acquisition of the data through his interactions, but also focused on *contextualising that data* through the acquisition of secondary information *over the same interactions*. Because of this, Simon's interactions with the sources of information can be categorised as *complex explorations*. These contrast with the kind of interactions made by Louise in her forecasting decisions, which may be categorised as *shallow*. Simon visiting the sales personnel on-site, or him visiting people in their offices, are clear indications of the *urge* he has had for the secondary information, which he perceived too complex to be acquired through telephone or electronic mail. Simon's experiences also highlighted the fact that contextualising is not necessarily an isolated event, but could well be an iterative process that occupies the entire information-seeking interaction.

Simon observed that XD's head office environment, particularly the newly-emerging culture has facilitated rich channels of communication. These informal systems have clearly mitigated the limitations he encountered with electronic mail or telephone. However, one reason for Simon's previous cynical comment over these media of communication was that his interactions were mainly with site personnel. Simon's view was that electronic mail and telephone are not 'rich enough' to handle their physical separation and attitudinal difference. Thus, Simon makes regular field visits for his information-seeking, and he is known for his 'meetings in the car'.

Even Louise, the CBU director, noticed the changes in their head office communications. Louise seeks information from various sources. The main ones are: the three therapy teams, central marketing team, finance division, business intelligence unit and site sales personnel. Only some of this information is proactively disseminated to her and the rest has to be searched for. Louise experienced particularly that the search for information has become easier because the *repeatability of the interactions* has improved significantly over the past two years. Previously, the repeatability had been poor due to the poor communication culture, and data flow had been rather formal with little provision for the acquisition of secondary information. Louise commented that the search for information has now become an iterative process facilitated by the presence of alternative channels.

> 'If what you already know is not good enough to make the decision, then you've got to think about what you *ought* to know and try to move there. But the problem is most of the time you don't know what that is....the only thing you can do is follow hints and find the information, and that needs lots of interactions'.

Louise compared XD to her previous employer (Louise has been with XD for seven years) to point out the fact that XD's emerging communication environment is two-directional. By this she meant that a person can easily 'get back' on to a disseminating source if further clarification is required. [However, the communication between head office and the field sales personnel was not so two-directional.] She described XD's head office environment as friendly and obliging, and its positive impact manifested itself mainly through the improvements in the flow of secondary information. The company's 'open door', 'glass wall' and 'casual dress' policy may have had some positive contribution.

> 'We have a 'talking culture' here. I am not reluctant to knock on somebody's door to ask questions. I mean, sometimes they say "can you come [back] in five minutes", [and] that is fine, but no one says "send me an e-mail". So, if something is not making sense it won't take you that long to get it sorted'.

Head office communications have gone through a significant transformation during the past two years. The change has been more towards proactive dissemination. Previously, every manager had to prepare a weekly report, which was then compiled with the others and distributed to all the managers. This system was abandoned by the new Vice President, who introduced weekly briefings that are held on Monday mornings. These are 'no minutes' meetings which people are expected to attend without failure.

> 'People hardly read weekly reports to learn things, it is boring stuff, you know. People use them only when they have to find something. But, weekly meetings are much better, you are in the shake, sometimes you get confused, but that is the push to find out things....No minutes, only action points....it is not compulsory to attend, not like NASA, but people have got into the habit now'.

These have partly assisted in breaking down the departmentalistic structure that prevailed for years and the organisation has been transforming itself into an organic state. 'It was needed' commented Louise, because the individuals are now constantly informed about change, and the environment now facilitates exploratory interactions better than it did previously.

4.2.4 Information-Seeking by Andrew in Routine and Non-Routine Tasks

Andrew, the director of the Midlands region's CBU of XD adopts a different information-seeking strategy to Louise. He conducts a telephone conference every week with all the field sales staff.

> '....It is not easy with twenty three people, but we manage. Lots of things come up, the things that take long to sort out with e-mail. I am the one asking most of the questions, but everybody get a chance....some people in the company think this is a waste of time...they have a point because the field staff won't tell everything, there is some competition among them. I still don't mind because the people in the field know what is going on, but they don't know precisely what I

am doing here or what I want, so this is a good way of prompting them, and we get properly aligned'.

Andrew is in his mid forties, about 6'4'' tall, and a long timer at XD. He joined the company as a sales person and worked all the way up to become the unit director. Before becoming the director he worked as the head of sales in the Midlands region. He has also worked as the product manager for one of the therapy teams. Andrew has adopted a more formal approach to management than Louise. He described himself as 'not very friendly', yet many in the company see him as kind and easy to get on with. Like Louise, Andrew too does not believe in imposing rules on his staff, but he has communicated the feeling that 'he is watching'.

Andrew's reasons for conducting the regular telephone conferences were rooted to some degree in his attitudes. He has been in the sales force for a long period, and therefore he believes that the sales staff carry up-to-date knowledge about the business environment. Therefore, even as the director of the unit, he perceived that his knowledge about the dynamics of the sales environment was limited. This was implied when he stated: '...people in the field know what is going on...'. Andrew has the view that the evolutions of many aspects of his business environment carry significant levels of turbulence. This contrasted with that of Louise who said that she knows what is going on. Because of this, Andrew had limited faith in his pre-knowledge, and therefore his interactions with the sales staff were seen as much more exploratory than Louise's.

Furthermore, Andrew's information-seeking behaviour was influenced additionally by his time-consciousness, where he stated repeatedly the importance of 'sorting out things straight away'. This was another reason for him to conduct the telephone conferences because he was extremely concerned about not having sufficient time to *think*. He commented, 'the time we have is enough only to do things, not to think'. Andrew found he is able to get many things clarified over the conference, so that only a little thinking is required subsequently. He commented:

> 'If you read a few memos, then you have to sit back and think how they connect, or why they don't connect. But instead if you talk to the people who wrote the memos then they will do the thinking for you'.

Clearly, time-consciousness is an important driver for Andrew's exploratory interactions with his sales staff when seeking information. That is, Andrew ensured that he not only acquires the data through his interactions, but also contextualises that data over the same interactions so that he saves time. This was facilitated in a reasonable way for him by telephone conferences.

A main difference between Andrew's and Louise's approaches to interaction was that Andrew tried to achieve a shared understanding with a large group of people simultaneously, while Louise did it with a limited number of selected people, and individually. These differences between approaches were attributable more to their differences in personalities than to any other contextual factor. Andrew was a better communicator in many aspects compared to Louise, even though he was firm in his speech. In a subsequent comment he highlighted the following aspect:

> 'I try to avoid having favourites among the sales staff, or among anybody in my unit. It is not that easy, but I am trying. Lots of time I try to understand their opinions, not just naively reject, thinking oh! he is not clever, or something like that. I believe everybody has something to contribute....'

Through this comment Andrew implied he is trying to see information in people's opinions by looking beyond the perceptions on personalities. Here he referred only to his own staff, however his comments about other people in the company contradicted the above claim. Andrew naively ignored the opinions of some of his colleagues in other departments because of their inadequate previous performances. Despite this, Andrew is a very interactive person who takes the maximum use out of the flexible culture at XD's head office. He always complained of not being able to have as much interactions as he wishes.

> 'Unfortunately I can't have chats with everybody I want, people are busy, they travel, but still I like to talk to a few people in detail, it is always better than getting a load of numbers....numbers are important, don't take me wrong, but we don't have enough time to think through all that, so I always try to borrow the thinking'.

The phrase 'borrow the thinking' can be interpreted in the same context as exploratory interactions because the alternative strategy would have been to 'think over the data'. By borrowing the thinking, Andrew clearly sought for the secondary information as well. However, even in time-unconstrained situations Andrew seemed to have preferred detailed talk, but not to the extent that he preferred in time-constrained situations. In answering the question 'when do you think detailed talk is not important?', he commented,

> 'When the information looks good ha! ha! ha!.....If I have enough time to look through all the information carefully I wouldn't bother anybody...'

Andrew was asked again 'how do you know whether information is looking good?' and the answer was 'when I know what is going on'. At this point, a reference can be made to Louise's emphasis on brief interaction, which too was driven by a similar perception. But, Andrew admitted that he alternates between clear and unclear states as he progresses forward in the decision-making process.

> 'If I see anything strange with the information, I always try and get back to the source....Yesterday I was confused over a finance report and I went and asked LG (finance director). He is there all the time, five days a week, and he always has time for you. LG is the most organised person I have ever met....and when we discussed I realised my views were wrong....or maybe sometimes I have understood the information wrongly....'

It was seen that XD's head office represents a data-rich environment for the decision-makers, yet individuals often encountered problems in the search for secondary information. This was considered very much a personal responsibility with only little formality. The company's emerging culture seems to have influenced positively by

reducing the communication barriers amongst the individuals, but still there was friction, mainly in the areas where technology was involved. Some of these will be highlighted in the following sections.

4.3 Decision-Making in Therapy Teams

Therapy teams are the central strategy-making bodies for the company's products. Their primary role is to maintain and improve the competitive advantage of products by formulating strategies at appropriate times. The therapy teams are almost all based at the head office. These teams are less complex compared to the CBUs, and comprise mainly the product managers, assistant product managers and information personnel, headed by the director of the team.

4.3.1 Michael's Initiative

People in therapy teams seek information from a wide range of sources within and outside the organisation. Michael, a product manager in the CNS (Central Nervous System) therapy team commented about his sources of information:

> '....I deal with other product managers, I deal with business information people, I deal with medical advisers, medical information specialists, clinical trial people, working directly with CBUs and their field representatives....'

Michael's main responsibility is to formulate competitive strategies for a subset of CNS products. Part of these strategies are audited before implementation by a group, including the director, but the rest are usually submitted directly for implementation. Michael found even those strategies that get audited before implementation are altered only very rarely, therefore his responsibilities are not diluted at any time. Michael found that trust is playing a major role in these processes, and he implied that the trust has developed mainly through his performances.

> 'People don't bother tracing every detail to know how I got there, they just look at and see whether it make sense. We know each other fairly well in this place, David [director] trusts me because I haven't made any major cock-ups yet....but, if there is a problem, if it doesn't make sense he always pops around and asks why I suggested that'.

Michael receives many queries from CBUs regarding his proposals. Most of these are for clarification purposes rather than to challenge his suggestions. Michael ascribes these to the lack of understanding of each other's domains, where he does not claim a good knowledge of all the CBU activities. Most of the queries he receives from CBUs can be answered by providing additional information, or taking the inquirer a few steps into the formulation process. Michael does not believe in publishing results with too much detail.

> 'I send my suggestions in a little summary, I never send pages and pages of information, it is a waste of paper and [a] waste of mind, because people don't bother to read, they just come back and ask you. This way I give them the message, bang!, and if they want any more, yes I am here....I don't know what exactly the guys in CBUs want sometimes. I can ask them, but they may not be thinking about it now...so, the best thing is to wait for them to come to me'.

Michael started to put some of the additional information to back-up his strategies in the 'shared drive' of the company's computer network. This however had only a small impact, and he interpreted the reason as 'the information was not structured enough'. This supporting information comprised several pages of text and often some spreadsheet data, which Michael published almost in its raw form. This was mainly due to the lack of time, and Michael did not believe he could achieve a substantial reduction in queries just by improving the structure and format of this additional information. 'That is a full-time job' he commented about re-arranging this information into a more useful format.

The reason behind Michael's initiative was that he observed the problem that people encountered when trying to contextualise the data that he presented as his strategy proposals. For example, Michael often proposed strategic variations to promotional activities, and CBUs usually found these compatible with their own independent opinions. However it did not happen in all occasions. Michael explained that he sometimes sees a broader picture than those people in CBUs, and on such occasions he observed that they have failed to relate his proposals to their own opinions about what is going on within the region. Because of this, the CBUs were not clear about

how to use Michael's data in their own decision-making tasks. Therefore Michael's publishing of his background workings on the network can be seen as creating an explicit source of secondary information. However, this effort did not create the expected result mainly because, firstly, the created source was complex and it was not user-friendly, in particular, it did not take into account the *situational context* within which people sought for secondary information. Secondly, this source was fixed in both content and format, therefore it provided easy answers only for a limited number of queries. It did not take into account the fact that queries that are raised in an act of contextualising can be rather specific and not standard. Because of these reasons, people naturally found that it was easier to ask Michael than struggling with his additional information.

For example, Simon from the CBU did not think Michael's effort to put information on the network as a very useful act. The reason put forward was that Simon's decisions are only partly routine, which require information in a specific way that is not *easily catered* through Michael's effort. Simon referred to a specific example where Michael had suggested certain levels of promotion for his portfolio of products during the next three months, for which he provided detailed supporting material through the network. However, as a result of this suggestion, Simon had to make a substantial reduction in promotions for two other products, and this reduction he wanted to spread over a period of six weeks. This was a counter proposal to that of Michael's who suggested to achieve the new levels of promotion immediately. Simon perceived it as too cumbersome and time-consuming to evaluate the effect of this counter proposal from Michael's supporting material. He therefore decided to raise a personal query with Michael.

Michael's initiative can be compared with the system of weekly reports that has now been abolished and replaced by weekly meetings. Weekly reports carried too much data in inflexible formats. Therefore, their value was limited to the people at XD who were part of the dynamic organisational life. It may have contrasted with the value assigned by someone who could afford 'leisure reading' or 'laid-back thinking' for which people at XD received only very little opportunity.

However, Michael had understood the fact that information-seeking is not straightforward, but often contains a clarification phase where secondary information is sought.

Michael himself admitted facing similar problems in his own decision-making. In answering the question 'how often do you get the information [data] in the form you want?', he commented 'Not very often. Some you can sit down and work out. [The] rest is difficult, [and] sometimes you need to get back'. Michael's general view was that he *searches* for information more than he is *given* information.

> 'People can provide me information only if they know what I want. Certain things yes, the routine stuff, but even there you can have problems. Take simple market data. Sometimes you want to see how they have changed, sometimes how they have spread, why certain drugs have fallen or why they have gone up, lots of things like that. What you actually want depends on what else has happened, the other stuff that has been going on. So to give all that information someone needs to write a BIG report, and I won't have time to read through all that stuff'.

Michael's experience shows that customising data is not always an easy task in the context of dynamic organisational life. When each person wishes to have data in a specific way, catering for these personal differences often become impossible for another person who is also a busy organisational being. This being the case, the two acts of searching for data and providing data are not always time-wise synchronised, and therefore the recipient often receives data in some standardised format produced by the source. However, in the case of Michael, he recognised the problem that people could encounter with his standardised reports, and therefore he ensured that adequate flexibility is maintained regarding secondary information.

This shows that explicit sources of data are often un-customised in presentation because data searches are always problem-focused. This naturally gives rise to a secondary information need. Michael's initiative showed that trying to provide secondary information explicitly could be of limited use because the secondary

information need is also problem-focused. Furthermore, search for secondary information follows the ambiguities caused by un-customised primary data, which could make it difficult for people to raise clear queries. Therefore, although customising data is one effective way of reducing the secondary information need, its underachievement has to be mitigated by flexibility in secondary information channels.

4.3.2 Michael's and Tony's Experience with Explicit Sources of Information

One of Michael's important sources of information is the 'brand book', which is a folder maintained for each of the company's products. Up to a year ago, the brand book had been a physical folder, but now it resides in the company's intranet in the form of a website. Brand books are shared among all the divisions of the company for both storing and retrieving information, thereby acting as a central storage of information on each of the company's brands. These are maintained by the Business Intelligence Unit (BIU) through the inputs from various divisions of the organisation. The BIU has attempted to structure the data in a very generalised format to suite different users. Michael found that the 'brand book' has its limitations particularly in time-constrained situations.

> 'Sometimes the brand book can become complicated because it has too much information. Our intranet tools are not very sophisticated, it is difficult to search in the brand book, sometimes you need to download whole loads of stuff just to do a few calculations....I keep my own brand book, customised to my own needs. This is better than the intranet one [Michael showed his version of the brand book, which comprised a few complex-looking spreadsheet tables]'.

Despite this comment, Michael was one of the few individuals at XD who have taught themselves how to download the data from the intranet and manipulate it in a spreadsheet package. A majority of the individuals could not see beyond the summarised data (predominantly graphical images) provided by the BIU, but Michael was capable of it due to his technical knowledge. Therefore, to him, the intranet

provided a customisable source of data with which he adopted exploratory interactions. For example, Michael usually looks at summarised sales data in the brand book (intranet) because he believes that he carries a reasonable knowledge of what is going on. However, if the summary for a particular brand did not make sense to him, then he is capable of accessing the raw data and expanding the summary to show the regional and sub-regional variations. As a result of this, the opaqueness in summarised data have disappeared, and it has begun to make sense for him again. Therefore, having said that the intranet has provided a source of primary data to all, Michael's unsophisticated technical knowledge has made it a source of secondary information for himself. Hence, Michael used the intranet itself to contextualise the data that were provided by the intranet, while some of his colleagues had to seek alternative means.

A contrasting information-seeking strategy has been adopted by the product manager of the NHS team, Tony, who delegates the information search to the BIU itself. The staff at BIU have more control over the source data, and also more competent in manipulating large databases. They not only cater for Tony's requests, but also that of many others in the organisation. However, a problem often arises in specifying the request, which Tony found to be not straightforward in certain situations.

> '....The problem comes when it is difficult to tell them [BIU] what I want....sometimes you can't be absolutely certain about what information you need, when you see the stuff you think oh! I should have asked for that as well, but it is too late, no time to get any more....sometimes I catch one of their [BIU] staff, find a free time, sit down with her and sort out all the information while I am there'.

It can be seen that Tony has exploited the soft culture at XD's head office to create a source of secondary information for himself. However, his incompetence in handling computer-based data had created difficulties for him, particularly at time-constrained situations. He often failed to obtain BIU's service in an urgency, and therefore had little choice other than to interpret the summarised data in the best possible way or to seek assistance from colleagues.

In contrast, Michael claims he is not 'over taxing' the BIU, and he perceives that the task of searching for information should be 'a personal undertaking' to achieve the best outcome. The value of data can vary even when the same decision-making task is repeated, depending on how the task is configured. For example, certain aspects of a set of market data have more value in periods of dynamic competitor behaviour, but certain other aspects become valuable in periods of dynamic client behaviour. Michael perceives that it is *the individual* who knows the value of information, which he/she has determined in a context created by the other information. He commented that 'what you need is not a load of information [data] on your desk, but a way of finding the information that you really need'. Therefore, the requirement here is not to increase the volume of data, but to have efficient means of contextualising the available data by providing sufficient channels of secondary information.

Both Michael and Tony repeatedly emphasised the difficulties of specifying their information needs accurately. This was very much related to the non-routine nature of their decision-making tasks. From a naïve perspective, these tasks appear to be routine, but the problem was described by Michael as 'there are no formulae, only experience and gut feeling'. As a result of this, the search for information is not a one-off event, but iterative. Therefore, very often these individuals fail to obtain all the information that is required from the accessible data.

> '....in terms of formulating strategy I need to have a very good understanding of what is happening in the market, what is likely to happen, and what we can do to influence that to our best advantage. But we don't get this perfectly beautiful vision all the time, what we get is a rough idea about what is going on because you won't get all the information you need, or maybe you have the lot on your desk but not enough time to go through all that. At this moment, you need to decide whether you are going to waste any more time....'

However, on some occasions Michael found himself in an advantageous position because his interactions with computer-data were *repeatable* without too much effort. But, Tony found himself in a difficult situation because his interactions with the data

sources were through the BIU, which were not easily repeatable. As a result, Tony's interactive sessions with the help of the BIU staff were much more exploratory compared to that of Michael's, and he preferred to leave these sessions with a sufficient understanding of 'what the data can do to help in decision-making'.

The repeatability of interactions emerged as a vital aspect in the information-seeking process. When interactions are repeatable, people followed an incremental approach to information-seeking where they did not rush into exploratory interactions. This was clearly evident when people interacted with the BIU. The staff of BIU discriminated amongst people, a discrimination which was primarily based on their attitudes and communication capabilities. They happily addressed any request that came from some people while they implied reluctance with certain others. As a result, those requests made by the latter category were unnecessarily detailed because they tried avoiding further requests.

Within the last three years, the organisation has been transformed into a data-rich environment, which is partly attributable to technological advancements. However, Tony was concerned about the adverse impact from the technological change, which he perceived to have created 'data dumping'. He argued that having too much data is not much different to having too little data. This was true on the grounds that although the amount of accessible data has increased dramatically, there had been only little concern about the data-handling tools. Nor has much concern been given to training staff on the available tools. Tony states this as a reason for him to seek help from the BIU. The problem here is not obtaining raw data, but abstracting the right information from it within the available time space to advance understanding of what is going on. Therefore, what is required is the efficient means of contextualising this data, but Tony implied that the company's information technology has not provided enough support.

> 'Yes, technology can create spare time for you, only when finding information [data], but you could lose all that plus even more when you try to get something out of it, something you really want. My day is twenty four hours, my week is only seven days, that doesn't get any longer. Those days, much of this time was

> spent to get into the sources, get the information [data] you want, but now three times that data is given to you. The question is whether that gives enough information to make a good decision....'

Nevertheless, he admitted that the cultural and structural change that has taken place during the past two years has diluted the need for technical knowledge. The vast improvements in cross-departmental communication have opened up potential sources of knowledge for people. Thus, in the absence of help from the BIU, Tony sought informal assistance from his colleagues in other departments who often helped Tony to put the data back into context.

Yet, a problem lies clearly in the technical infrastructure of the company, which does not provide enough for contextualising the accessible data. People themselves are partly responsible for this problem. For example, Michael is capable of seeing beyond the data that are displayed on his computer screen, therefore he often receives a satisfactory answer to the implicit question: 'what is this data, and how to use it to solve my problem?'. However, even Michael sometimes found himself irritated by the system's limited capability. One important suggestion has been to improve the user-friendliness of the intranet so that even people like Tony could explore the data all by themselves. However, the gains from this have not yet been justified for the allocation of a sufficient budget. The suggestion has received a mixed response because many individuals have now established their informal channels of secondary information, hence they give secondary importance to further advancements in computer technology.

4.4 Business Intelligence Unit and Business Information Group

4.4.1 Business Intelligence Unit

The Business Intelligence Unit (BIU) and Business Information Group (BIG) are two separate departments at XD, which work almost as a single unit to provide information to the decision-makers. The difference between the two is that the BIU deals mainly with external data and the BIG deals mainly with internal data. Both use the same IT resources, and also share some personnel. The BIU has its origins in the old data-processing facility while BIG is a recent formation through combining the company's various library facilities.

The BIG purchases huge electronic databases of market information from a third party to support company's strategic decisions. These are seen as extremely rich in data, extremely complex to manipulate and extremely expensive to own. Because of this high cost element, the company buys these only to support its best-selling products. Andrew, the CBU director commented 'it is much more gut feeling for the other products'.

These databases are primarily handled by the BIU which produces several abstracts for use by end-users. These take the form of standard summaries that are loaded into brand books where the user can find them. In addition, BIU staff process these databases to satisfy various requests made by users for specific information outputs. For example, Tony's requests that were mentioned previously fall into this category. Paul, the director of the unit, has noticed a substantial increase in such *odd* queries during the past twelve months. He perceived the reasons as firstly, the increases in the non-routine nature of decision-making, which he ascribed to the company's steady growth during this period, and secondly, the complexity of the data itself. For many in the company, even handling the abstract summaries that are produced by the BIU is a complex task. Both Michael and Tony ascribe this to the lack of good-enough tools and training. Tony, in particular, described his association with these databases as 'shallow and distant'.

> 'I use the Business Intelligence web page quite a lot. Also the stuff they put in brand books. They put things like graphs and tables. Its good....but, not exactly what I want all the time. This is fine material if [I] had to do a presentation, you just cut and paste, but it is too shallow when you have to make a decision....know what I mean?....I need to go a bit deeper, so I take the option of asking them, the Business Intelligence people. They are very good, they know the problems people have with the brand book'.

Despite the heavy demand for this type of interaction, the BIU staff puts their best effort to support individuals with their information requirements. The personnel at the BIU have moved beyond just data-processing into the role of consultants, and act to give depth to users' interactions with this primary data. However, one problem that is significant to BIU is that user queries have become less specific in terms of output. Paul made the following comment regarding this:

> 'Most of the requests we receive here are not just simple requests for information. I can call them 'submission of problems'. So we have to understand what they [are] doing, have a little chat about what they want, tell what we can do....and then only we can actually decide on the output....'

Many people have found that the information provided by the BIU for their requests was not entirely satisfactory. Paul's view was that '....either they haven't asked properly, or we haven't understood properly....'. As a result of this, such requests have now turned into interactive sessions where sometimes, depending on the availability of time, BIU personnel try to abstract information while the user is waiting. Paul commented 'we are like Kwik Fit now', which had a deeper meaning in the context of this problem. Here, *time* is the main driving factor that stimulates the user to avoid repeated interactions over the same piece of information. However, many decision-makers found their understanding changes with the accumulation of information, therefore they sometimes have to visit the same data but with a slightly different perspective. Louise, the CBU director found herself in the following situation:

> 'People like me are a trouble to the Business Intelligence. We sometimes don't know what information we need exactly....We ask for what we think is useful....Yesterday I asked Linda [BIU staff] to put clients who used L [the brand name deleted] last year on a monthly chart, but actually I should have asked her to get the details of clients who used both L and S [brand name deleted]. But, I didn't realise it till this morning....'

The problem Louise had was the reluctance of asking Linda to repeat the same operation, where she commented 'I am bit relaxed on this, but I feel I am going to be a nuisance now'. However, BIU staff always welcomed any request from Louise because of her mild manner. But certain other members in the organisation did not receive a similar reception. Louise was however expecting an obstacle to her present relationship with the BIU because of a proposed decentralisation of CBUs to locate them in the respective areas of concern. As a result of this, CBUs will be moving out of the main head office premises. Even Louise and her team will be moving into new accommodation situated approximately 100 metres down the road.

> 'I will not be able to have as much interaction as I do now. I can shout at them from where I am now, but soon I will have to rely on the telephone and e-mail....it will be the phone most likely'

Andrew, the director of the other CBU, has adopted a very proactive approach to obtain information from the central databases. He has learnt the Structured Querying Language (SQL) that is used to abstract information from the company's databases. Because of this, the BIU has provided him with a special password to access the main databases directly from his own computer workstation. Andrew claims that he is able to satisfy about 90% of his information needs without contacting the BIU personnel. Paul, the BIU director, ascribes this purely to Andrew's personality. Andrew stated:

> '....I can go as deep as I want....sometimes I sit down and surf the databases, just like you surf the internet....you can find interesting stuff, may not be essential to my work, but one thing I must say is, there are lots of things in these databases [that] people ought to know, but never get the opportunity....'

It can be seen that in addition to their main task of acquiring data from the external sources, the BIU has offered a valuable service of helping the individuals in terms of positioning this data within the context of their specific decision-making tasks. Therefore, the BIU represents an effective source of secondary information that mitigates the complex and user-unfriendly data provided by central databases. As a result of this additional service provided by the BIU, the rich data that the company buys is used effectively in their decision-making tasks.

It can also be seen that such a service has been enabled by both the nature of the interpersonal relationships in this organisation and its physical layout. However, many individuals still perceived this as inadequate, particularly in time-constrained situations, because they could not interact with the data in a way that was exploratory enough to be able to contextualise within the little time available. The BIU has tried to offer their interactive service to all the people, but it was impossible at times of peak-demand. The staff at the BIU personally preferred these interactive sessions over the deferrable requests because the users often complained about the information, or they required more information, and therefore returned with further requests.

It can be seen that the only way to reduce the workload of the BIU is to improve people's data handling capability. This involves not only improving the data handling tools, but also training people to obtain its maximum potential. Paul's long-term objective is to develop systems so that people become independent in terms of information search. He encouraged the proactive approach of Andrew and therefore offered him support to develop his capability. However, Paul explained that any improvements to IT-based information systems should provide a better alternative to people than 'running down' to the BIU as they currently do. He sees the proposed decentralisation of the CBUs as an opportunity to justify the allocation of more funds.

4.4.2 Business Information Group

In contrast to the BIU, the Business Information Group (BIG) focuses on the conventional knowledge management aspect. Their activities can be described as converting the knowledge that is held either individually or in groups into organisational knowledge. Jane, the manager of the BIG said they identified the need for knowledge management by studying people's interactions, and not because other companies are doing it. She said that originally certain individuals had taken the initiative to share some of the information by keeping it in the library. BIG has followed that initiative to create central databases of sharable information, and now it contains on-line information and a catalogue of other sharable information in the organisation.

In the summer 1999, Jane carried out a survey within the company to audit her efforts in the BIG and to determine its future direction. In this she found that people use the catalogue much more than they use the on-line information, in fact the usage rate of the latter was very low. The main issue was reliability. In conversation with Andrew, the following comment was made:

> 'Business Information Group can do much more to improve their databases. At the moment they don't say where the information came from....you know, it can be facts, or it can be somebody's opinion....whose opinion?....also, they don't give any dates. Dates are very important....This stuff is useful sometimes to fill the gaps, you won't learn an awful lot....what you look for is where they come from and how old they are....'

Andrew's concerns were supported by Louise when she stated that BIG represents the 'shallow end of knowledge management'. She further stated that 'we are too organic to rely on a technology model', by which she implied that the organisation allows much deeper interactions with knowledge sources than that is allowed by BIG's on-line information. Louise's verdict was that on-line information is 'sometimes useful to fill the edges'.

The problem with the on-line information database was that it allowed only shallow interactions. This information 'filled the gaps' or 'filled the edges' only if people carried a reasonable understanding of what was going on. Even in such cases, on-line information suffered from the lack of reliability where people like Andrew often accepted it only after further clarifications from the BIG or from the original source. However, on many occasions Andrew used the catalogue of available knowledge to direct himself at the sources where he can have exploratory interactions. In this context, the on-line database contrasted with weekly reports because it was easy to search but contained only a limited amount of information. However, within the evolving culture of the company, this database offered the service of *pointing* at potential sources of secondary information.

Nevertheless, the on-line information service has showed some success in disseminating medical information. The reason is that this information is compiled systematically by the medical information specialists of the company who work in association with the therapy teams. This subset of on-line information has received its credibility through the fact that it is produced by a small group of specialists who are well known within the company. Jan is a qualified doctor with over five years' experience in the profession who works within the CNS therapy team. He joined XD approximately four years ago, after completing an MBA degree. He thought that this additional qualification has made him understand better the commercial interests surrounding his profession.

Jan's job at XD is to provide advice to his therapy team regarding what is going on in the world of medical research. The information is produced very much in focus with the activities of his own therapy team. However, they are used to a lesser degree by the organisation at large, including its US counterpart. This sort of dissemination has been enabled by the on-line information facility initiated by the BIG. Jan described his role in two aspects: translating relevant scientific literature into easily understandable formats and drawing opinions from them to support the company's strategic decision-making. Jan commented:

> '....team members are not interested in deep scientific stuff, there is not enough time to read all that, and most of all they don't have the knowledge to understand....There is a lot going in medical research and it is difficult for my colleagues to keep up with it....I read all major medical journals, loads of scientific material, and inform them if I find anything important to our product strategies'.

Jan is not only a proactive source of information, the team members approach him with various queries regarding other people's opinions. Prior to Jan joining the CNS team, the company had one medical specialist who carried out a central role providing advice. This person disseminated his opinions in a weekly report to all the therapy teams (the organisation had a different structure then). But, the teams had found this advice not specific enough on many occasions. Michael, the product manager of CNS team commented:

> 'We want information mainly relating to CNS research....weekly reports gave us useful information, but we had problems when one of us had to get more information about something....So, we strongly proposed to have a medical person just for us. Jan is good, he knows what is going on inside the therapy team, so we can easily get the information now....we are more equipped as a team....'

The decentralisation of medical information specialists is seen as a major development by almost all the departments. Now even the CBUs have their own medical advisors. Many in the company perceive the driver for this as relating to time. Both CBUs and therapy teams emphasised that medical advisors should have some insight into their work. They stated through experience that otherwise a significant amount of time is wasted in the process of communication. There had been many situations where even a query that required a simple outlined answer had taken longer than required. Therefore, the present system is perceived as satisfactory where each team has their own advisor, and the information they produce is shared across teams via BIG's on-line facility. Michael further commented: 'There are many occasions where you need only a simple answer, I look in the database first....but if I am tight for time, then I ask Jan'.

People of this company have access to rich sources of scientific data, just as they have access to market data, but it seems to have caused fuzziness more than helping decisions. The reason is clear that there had been only few means of contextualising this data to provide information that is directed at their problems. Therefore, by decentralising the medical advisers, each team has been given an efficient means of obtaining the secondary information they require.

4.5 Summary and Conclusions

This chapter presented the information-seeking behaviours of selected people within the context of the company XD, and highlighted several concepts and phenomena within their appropriate empirical context. These will be used to draw insights into people's information-seeking function in Chapter 6. However, as the following chapter (i.e. Chapter 5) presents information-seeking in a company that contrasts with XD in terms of macro contextual factors, this summary aims to draw attention to some of the key observations made in relation to XD.

4.5.1 Information-Seeking Environment

A key aspect of the environment at XD where information-seeking took place was that it exposed people efficiently to both internal and external sources of data. Over the years, the accessibility of data sources has increased and the period from search to supplying data has decreased to create a *data-rich environment* for decision-makers. This environment however did not provide people too many alternative sources of data. On many occasions, people had to depend on a single source, but it was accessible efficiently, and therefore obtaining data was not considered a problem. People implied that their focus has now changed from 'data search' into 'information search', which was an important contextual factor underlying their information-seeking behaviour.

This data-rich environment however proved to be problematic because, although data were efficiently accessible, the mechanisms through which people searched and they were supplied data, which may be known as *search-supply mechanisms*, were not always efficient enough to provide data *appropriately customised* to their specific decision-making tasks. Hence, seeking information in this environment can be described as synonymous to *selecting an interpretation* out of the multiple and sometimes conflicting interpretations of this un-customised data.

Search-supply mechanisms in this environment comprised not only technical systems but also social systems that often crossed boundaries of the organisation. Their inefficiencies were of three main kinds:

- People could not always raise clear queries, or specify data needs accurately, because their information needs were not totally explicit.
- People lacked the commitment to customise the data they provided to others because they themselves were parts of the dynamic organisational life.
- People lacked the skills and competence to explore data sources, or alternatively these sources were too inflexible for customising.

Hence, key characteristics of XD's environment were that it was data-rich, but inefficient in terms of obtaining customised data. These characteristics have formed a context for the information-seeking function in this environment, which has in turn formed a context for people's information-seeking behaviours.

4.5.2 Information-Seeking Process

Information-seeking processes observed at XD were influenced strongly by the characteristics of the environment that was described above. Data that resulted from inefficient mechanisms was imperfect, or un-customised, and therefore people often encountered *opaqueness* in the relationship between this data and their decision-making tasks. This was observed as a problem fundamental to decision-making at XD. And, as a result, information-seeking in this environment often comprised *a second tier* in which people sought further information to put this data into the context of their decision-making task without having to adopt trail-and-error sequences. This act was named *contextualising*, and the information acquired for this particular purpose was named *secondary information*.

4.5.3 Contextual Aspects

Apart from the key characteristics that were highlighted in section 4.5.1 above, the descriptions presented in this chapter highlighted several other aspects of XD's environment that created a context for people's information-seeking behaviour. These aspects were not created exclusively by XD's macro context represented by its culture, routines, nature of business and the business environment. People's personal qualities and their interplay with the macro context also determined an important aspect of their information-seeking environment.

Firstly, information-seeking behaviour was influenced by the elements of *continuity* and *novelty* encompassed in decision-making tasks. People at XD mostly dealt with dynamic systems where decision-making was continuous, and this can be attributed to the macro context of this organisation, particularly to the nature of its business. But, intrusions of novelty was inevitable mainly due to changing circumstances. People implied that continuity in their tasks usually related to brief interactions because contextualising data was relatively easy. In contrast, the novelty in their tasks usually related to exploratory interactions because contextualising was relatively difficult, and required more information.

Secondly, information-seeking behaviour was strongly influenced by time-constraints. Although time-constraints at XD were seen as objectively imposed by both the nature of its business and the turbulence in its business environment, these time-constraints influenced information-seeking only via people's interpretation, which was subjective to the company's communication culture, communication systems and personality factors such as attitudes and experience.

Thirdly, information-seeking behaviour was influenced by people's familiarity with data in terms of structure and references. For example, Louise was familiar with the kind of data she routinely expected from sales staff, while Simon was uncertain about the data he was expecting to receive from sales staff in connection with the promotional campaign. The familiarity with data can be ascribed to the establishment of both formal and informal information channels in the environment, freedom to use

these channels and also personality factors such as enthusiasm, technical knowledge and experience.

Finally, information-seeking behaviour was influenced by *people's awareness* about the availability of secondary information, particularly the possibilities of *querying* through information channels. Although XD's technical infrastructure carried limited capabilities in this aspect, people were aware that its emerging culture has enabled informal channels which they could use to clarify doubts in data or even to obtain data with clarification. One important factor was the improvements to *repeatability of interactions* in the recent past, which has given people confidence for not rushing into exploratory interactions.

4.5.4 The Next Chapter

The next chapter presents information-seeking behaviours of people at the company XA, which represents a context that contrasts with XD. It aims to draw comparisons with XD to enrich the concepts that emerged in this chapter.

Chapter 5

Information-Seeking Behaviours of Decision-Makers at the Organisation XA

5.0 Introduction

This chapter presents information-seeking behaviours of people at the company XA. It draws attention to the contrast between macro organisational context of XA and XD, and how it influences information-seeking phenomena observed in the previous chapter.

XA is seen as a prevailing bureaucratic body, which is large and dispersed, and hence a major portion of the interactions has become virtual. One important feature of this environment is the attribution of trust through bureaucratic routines. Hence, although the domains of the free-flow of information are large, the channels of information show inflexibilities because they are *not* governed by the attitude: 'friendly and obliging'. As a result, the achievement of contextualising is seen to have been affected by the environmental factors more than it is affected by personal qualities of people.

Descriptions presented in this chapter are scattered experiences of several people in the company's Strategy department. Part of these experiences are compiled and presented as mini case studies to highlight theoretical issues. These experiences not only show people's own information-seeking behaviours, but also show how their actions have affected other people's information-seeking behaviours, and particularly how these actions have depended on contextual factors. This enriched theoretical issues emerging from the data.

This chapter mainly investigates the contextual dependence of key phenomena: opaqueness, contextualising and secondary information. It is important to notice that these phenomena exist at a broader level at XA than at XD; a reason that can be ascribed to the deafening of the personal element by a 'routinised' environment where information flows are mainly governed by the attitude: 'duty assigned by bureaucracy'. Descriptions presented in this chapter are mainly focused on highlighting friction in channels of secondary information caused by the lack of informality, which contrasted significantly to that at XD.

The chapter begins with an introduction to the company and its culture. This is followed by information-seeking experiences of a senior strategy manager, alias Alan, and four mini case studies compiled from the experience of several other people. The chapter ends with a summary and conclusion that set grounds for the abstract-level descriptions presented in the next chapter.

5.1 About the Company XA

5.1.1 The Company Profile and the Business Environment

XA is a large UK based international air carrier. It was ranked (TIMES survey) the 29th largest company in the UK in 1997 (on market capitalisation) with an annual turnover of 7.8 billion pounds. The company has shown steady growth in both turnover and profits since the 'nineties depression where the profits in 1997 were in excess of 700 million pounds.

In its international ranking, the company became the 9th largest airline in the world in 1996 in terms of total passengers carried. Yet, in the same year it became the world's largest international carrier in terms of international passengers carried. This pronounced difference in ranking is attributable to the large US domestic air travel market where six of the world's largest carriers earned their ranking by serving this internal market. XA's competition was truly in Europe where in 1996 the top five international carriers were European with Lufthansa occupying the second position below XA.

The business environment of the company has suffered severe transitions during the past decade. A main cause has been deregulation in the international air travel industry that has been spreading gradually around the globe. A major breakthrough came in 1987 when the European Union expressed their consent to creating a truly European air transport industry. This was followed in 1993 with the emergence of 'Open Skies', which was a move towards creating a single European air travel market. This was finally achieved in April 1997 with the declaration of the 'eighth freedom of air'[1] among member states.

The deregulation brought both opportunities and threats to individual carriers. The opportunities were such that the market became unrestricted, and therefore further growth became possible. The threats were such that stronger companies were able to

[1] Eighth freedom of air – The privilege to carry traffic between two points within a foreign territory state.

grow and survive at the expense of weaker ones. The industry reacted to these changes with a new paradigm where companies worldwide, including XA, began to form various strategic alliances.

Another important change for XA was the changing structure of the international transfer passenger market[2], which again was a result of the deregulation. As the UK domestic market was reaching saturation, the transatlantic transfer passenger market[3] was showing the company scope for further growth. This can be attributed largely to the geographical positioning of London on the western edge of Europe. However, some of the company's European competitors were already ahead in capturing this important market.

5.1.2 Organisational Culture

The culture of XA is still dominated by the fact that it was under state control for fifty-eight years before it was privatised in 1987. During the ten-year period since privatisation, the company has gone through transformation, but its size and structure has dampened some of the changes before reaching certain levels down the hierarchy. A senior manager commented:

> 'Some of the changes are only in our minds, we know we are now working for a profit-making, high-rank organisation, so we want to see a difference, and we see it....I worked here for twenty-one years and the biggest shake I remember was around eighty two [1982] when we started preparations for the flotation. Again it took a few years, and some people were expecting serious changes after privatisation. I didn't see it really happening [and] most of the problems we had [then] are still around'

[2] Transfer Passengers are those who change aircraft at an intermediate port before arriving at the destination. This port is usually the 'hub' of the particular airline (i.e. the port where the airline is based) from where it operates in radial from to different destinations. For example, British Airways' hub is Heathrow and Lufthansa's hub is Frankfurt.

[3] Air traffic between Western Europe and North America.

Even the physical environment has prevented the bureaucracy from disappearing. Ten years since privatisation, the company still occupied the same premises without much modification. This accommodation comprised several buildings in which the internal layout was mostly corridors and rooms with very few areas of open-plan design. Even those few open-plan areas held only an average number of around six people. This physical layout had resulted in small domains of face-to-face interactions for each person. Some people claimed that their face-to-face interactions are less than a quarter of their total interactions.

> 'You can easily hide in here. When you are out of the room nobody knows whether you are new here or [whether] you have been working for five years. I am dealing with some guys in this building for nearly two years now, but never met them face to face. It is not a big issue..... I had to attend a meeting a few days after joining the company. I told the others I am new, but they soon forgot and kept on asking me things as [if] I had been here for ever. I still can't understand on what basis they trusted my answers....'

It should however be stated that the company was at the time launching a move into new office premises that had been built in a site nearby. The move was to be carried out in stages, which would to take around eighteen months to complete. An important feature with this new facility was that it mainly contained areas of open-plan design, which may be seen therefore as a conscious act towards reducing the bureaucratic traditions and improving informal communication. However, it would take significantly long periods before the establishment of any changes to organisational culture as a result of the above move, and the duration of this research project was not adequate to capture them. Hence, the theory that we suggest in this thesis is substantive to the present environment of this organisation.

The company's culture is influenced also by regular travel abroad by most of the management staff. These official journeys usually take around three days, which is another reason for limited face-to-face interactions. However, the frequency of such travel varies among different departments. For example, the staff at the company's

Strategy department has engagements outside the office for an average of about 40% of the time.

Travelling abroad has resulted in heavy usage of electronic mail and voice mail, which is now becoming part of the culture so that even when people are staying in their offices, they use these facilities as a means of filtering messages. Furthermore, in the recent past there has been a shift towards using more electronic mail than voice mail. The reason for this has been that only a small percentage of a person's telephone calls are directly answered (around 25% for some people), and returned messages are sometimes missed or received at inconvenient times. The following comment was made by a strategy development manager, which shows the lack of control that people have with regard to communication:

> 'I always try the phone because I am addicted to voices [but] if I don't get in the first try [then] I wouldn't bother again unless talking to them is essential. I just send an e-mail. I wouldn't bother very much leaving voice mail messages. Yesterday I was at my desk only for maybe two hours [and] what's the point if someone comes back to me when I am not there?'

It is not the company's culture to 'knock on doors', which is not only between different departments, but also within the same department. People, as a habit, avoid ad-hoc meetings and prior arrangements are usually made. These can vary from formal meetings to just informal 'chats'. The inter-departmental meetings are of a different nature. These are usually preceded by a preparation time, even in the case of a brief chat involving two people. The following comment was made regarding a brief meeting between the Strategy department and the central Marketing department involving only two people:

> 'If someone wants to come down and talk I always ask what's it all about. I may not be the right person or it may be something [that] I don't keep in my head all the time. So I never ask anybody to "come straight away" because we could be wasting our time. Unfortunately, we do too many things in this company [therefore] it is not easy to keep a track of what all the other departments are doing. I know a little about what's happening in marketing but I don't know the details about things like their clusters or budgets because I don't need to know.'

What is very prominent in this environment is the 'trust' (e.g. Nandhakumar, 1999; Huemer et al., 1998; Luhman, 1979; Fox, 1974), which has received credibility from bureaucracy rather than from personalities. This has resulted in exchanging information without a shared view. In other words, there is not much known about where the information comes from or what purpose it is going to be used for. Statements like 'I don't care how they get the numbers' or 'I've given what they asked for' typically show this 'bureaucratic trust'. This type of bureaucracy is clearly attributable to the size and the complexity of the organisation that dominates people's patterns of interaction.

XA's culture can be contrasted with that of XD based on the fact that, in latter, communication channels are dominated by informality. The trust at XD was based on *proven* competence rather than *attributed* by bureaucratic routines. If the culture of XD was described by the statement 'friendly and obliging', that of XA can be described by the statement 'duty assigned by the bureaucracy'.

5.2 Decision-Making in the Strategy Department

The Strategy department is responsible for the strategic direction of the organisation in the medium and long term. It operates through five main sub-divisions: Economics, Business Planning, Strategic Relationships, Fleet Planning and Network Development. In addition to these, the department handles major cross-departmental projects as they arise. For example, the department formed a special project team in January 1997 to formulate the company's European strategy.

Strategy development takes place through the interaction amongst the five sub-divisions. The process usually begins from the Economics sub-division, which continuously monitors the regional and global economic environment, and forecasts changes in air travel markets. This information stimulates the functions of the other sub-divisions. However, the need for a strategic decision may originate from any of these sub-divisions, or even from some other department within the organisation.

5.2.1 Alan's Experience in Making European Strategy Decisions

Alan is a senior strategy manager who develops strategies for the company's European operations. He has been with the department for more than ten years, and this is his fourth year in his current position. He joined XA as a management trainee after completing a degree course. After training he worked for Passenger Business (Europe and Middle East) prior to moving into the Strategy department. Alan claimed that his knowledge about the entire organisation of XA is 'limited', however he claimed a comprehensive understanding of all its European operations.

Alan claimed he is engaged in tasks with different timeframes that his thinking horizon can vary from around two weeks to more than two years. He described some of his responsibilities in the following manner:

> 'Various departments which are involved in real operations have to ensure that the company will have enough resources in, say six months or one year to meet

> the demand. We [strategy] are the people who have at least some idea about what is going on, and I have to help the others [to] make this check every so often and propose the right move at [the] right time. You can imagine the scale of things we have to deal with here, you can't just buy a jumbo jet over the counter....'

Alan used the phrase 'right move at the right time', by which he meant that every decision has a particular time horizon. Alan does not make firm strategic decisions today for things that are to be implemented, say in two years. Instead, he makes proposals based on current information that will help the other departments to plan their decisions. For example, the traffic forecasts that are produced by the Economics subdivision cover a period of five years into the future. These are updated every three months, or following any radical changes in the economic environment. Alan said he has to have a good understanding of the impact of these changes to his proposals, and he reports the amendments to the appropriate links down the decision-chain. His opinion is that a proposal becomes a firm decision when the information becomes stable.

> 'I make lots of proposals, but it doesn't mean everything is implemented. Some get thrown away, some become void. It all depends on information, [and mainly on] how they change....You might see the need for some strategy two years ahead, but it doesn't mean you have two years to make the decision. Things are changing, therefore you can't collect information too early. You end up with about three months or even less to get all the information and make your final proposal. The important thing is to keep a track of all changes and report them because the others might not welcome surprises, and it is unfair'.

In answering the question 'how do you know when to collect information?', Alan said 'It is experience, and if you know what is going on inside the company, what is happening outside, how the business is running, then you get the feeling....'. By this Alan implied that the timeframe of a decision can be subjective, where two different people can perceive it differently depending on their experience, exposure and the proactive nature. However, Alan does not always see the need for a decision well in

advance, and there had been many occasions where the need has arisen after the information became stable.

In determining the stability of information, the influence of the experience and the exposure of the person has always been prominent. The influence of these factors has manifested itself even in the search for information. Alan claims that there are only a few formal mechanisms within the company that can be used to clarify doubts about issues. 'It is much more a matter of how long you have been here and how well you have done your networking', commented Alan, by which he implied that it is the individual's responsibility to 'find out'. In this environment, networking has become an important part of a person's job. Alan, through his long involvement in Europe, has developed a substantial network of people who are involved in the operations. However, there are some costs involved in networking:

> 'I know lots of people in Europe, not only our staff, people from travel agents, staff from other airlines, airports, and I get lots of information about things even before they come to my boss. But, these people expect the same from you, fair enough, I mean, sometimes you have to give them hints if something is going to happen. You have to be very careful when you are in a network. But, the problem is [that] if you try to find information, say through the formal channels you [researcher] mentioned, or if you wait for the right information to come to you, then you'll do nothing but rushing all the time'.

Alan's claim is that a personal information network is essential to meet the pace of his work. He says that although the company is involved in a very dynamic segment in business, the organisation itself is not sufficiently flexible for the members to find information at the speed they need.

> 'If you are a newcomer, for the first few months you will blame the bureaucracy for not giving enough information, or you will drown in data without anybody to help....It is very difficult for a newcomer to make good decisions, until you make few contacts and get to know right channels'.

It was seen that, as with XD, people at XA are provided with vast volumes of data, which are accessible through a number of different channels. The company maintains a sophisticated technical infrastructure that provides access to a number of large databases that hold data relating to company's operations. This data is unrestrictedly accessible by people from their own workstations. In addition, the company maintains many library facilities, located generally within different divisions. These are rich in data that relate specifically to the transportation industry, and are maintained through formal allocation of funds and personnel. Besides the above, the data are often exchanged at the individual and departmental levels for specific purposes.

However, despite the availability and richness of the data, people at XA were in a constant struggle to contextualise this data when it came to making decisions. In particular, those who were involved in short-term strategic and operational decisions were facing the dynamic aspects of the air transport industry, and they were often reluctant to claim up-to-date knowledge about their business environment. Therefore, these people emphasised re-contextualising the data almost at each and every task of decision-making. However, access to secondary information was not as efficient as this rate of re-contextualising. As a result, people often had to make assumptions about changes in circumstances in order to proceed with making decision. In contrast, those who were involved in medium to long-term decision-making were a little more confident in their knowledge mainly because they had extra time for contextualising.

The main obstacle to contextualising was clearly the inefficiencies that existed in the flow of secondary information. Unlike XD, this organisation was so large and complex that a *team* consists of people who were physically dispersed in many different departments, and they knew one another mostly through the telephone or electronic mail. Therefore, only a small percentage of one's domain of personal interactions could be described as 'friendly and obliging'. The remaining interactions can be described as 'a duty assigned by the bureaucracy'. This contrasts clearly with that of XD where the percentage of friendly interactions was very much higher. As a result of this, the possibilities of 'sorting out things straightaway' was limited because people often experienced difficulties in finding efficient means of having exploratory

interactions. Therefore, it was seen that people have found the alternative of 'information bartering' through networking better.

The regular travelling abroad by most people is an important cause for the friction found in information channels. Usually when senior managers are absent, their personal assistants scan received messages and then forward them to appropriate personnel. However, this procedure often does not work in an appropriate manner, and on many occasions Alan found important information had been held up without dissemination. One main problem is the high volume of messages, both electronic mail and written mail, received by senior managers every day, which is highly cumbersome for a personal assistant to sort. On many occasions, only the header of a message is read. Other people who do not have personal assistants might delegate this to a colleague. But very often they do nothing, which causes a complete blockage in the information channel.

What can be seen here is that people have formed isolated domains of knowledge even though they are often parts of several teams. Hence, decision-makers often have to access specific people for secondary information because the others can offer only limited help. On many occasions, these other people did not wish to take responsibility. This contrasts with XD where teams shared knowledge to a greater degree. Furthermore, delegation was easier in that environment because even secondary information was usually sought on an incremental basis leaving provisions for error-detection.

Alan found that information disseminated by personal assistants and colleagues lacks the tacit input from people who are absent. Usually, when a message is received, the recipient adds a short note to add his knowledge on the matter before forwarding it to another person. Otherwise it could sometimes be difficult for the second person to interpret the information. Alan often found that, even with these added notes, he needed help to interpret the messages in their appropriate context. Therefore, sometimes when the messages are disseminated in the absence of their addressee, they have to be referred to the originating body for clarification.

> '....You are dealing with other people's contacts. It is difficult when you don't know the set up, and there is no trust. You do the introduction, then someone might cross-examine you....I'll tell you something, you have to be good on the telephone....'

It can be seen that one main reason for people to emphasise regular re-contextualising is that they perceive the changes in the real world to be complex. They often perceived 'too many things going on', but only part is known to them. This feeling of opaqueness in the channels of information has sometimes forced them to withdraw from making decisions. However, Alan implied that the European air transport market is adequately transparent to him, although part of this is due to his personal information network.

Until the middle of the 'nineties, the Strategy department dealt mainly with medium to long-term strategic issues. The turbulence in the short-term was absorbed mainly by those departments that were involved in real operations. For example, 'price wars' were dealt with mainly by Revenue Management, and the Strategy department had only very little involvement. However, with more competition in Europe during the recent past, even short-term turbulence has triggered the need for more strategic thinking. Therefore, the Strategy department has higher involvement at decision-making level.

As the European air travel market became increasingly competitive, Alan's job too became increasingly complex. The small airlines in the region have begun to behave dynamically as a means of competing with giants like XA, and this has created short-term turbulence, which the company did not experience in the past. Alan commented 'these are not upside down changes, but pains in the a...'. As a result of these, the company's competitive position is violated in the short-term, and it is important for Alan to ensure that these situations are not prolonged. Usually, he has to make two decisions: a strategy for the short-term (what should be done immediately) and a proposal for the long-term (how to avoid such situations). The short-term strategy is assessed and approved by a panel meeting involving the representatives from the other relevant departments like Revenue Management and Passenger Business (Europe).

The proposal regarding the long-term strategy is entered into a pool with the other proposals that have arisen from different situations, and these are then assessed periodically by a panel of senior managers within the Strategy department.

Alan always prefers to formulate a feasible short-term strategy prior to the panel meeting. However, this is not always possible, and in many occasions he found himself struggling for information. In fact, Alan's struggle was mainly to find secondary information, but not the primary data. He was fairly competent in accessing central databases by himself to obtain the required data, which was adequate in some occasions to make the required proposals.

> '....with some of these I know exactly what is happening, I can do them with just one or two e-mails....'

Alan referred to a particular incident where the company's sales on the route between London and Düsseldorf (Germany) suffered seriously due to a competitor allocating an extra large discount[4] to sales agents. Alan was clear on the company's strategy in this case, and he commented:

> '....This didn't take me two days to come up with a solution with all the details, the information was on-line, and I had to send just one e-mail....but, here I was lucky....'

Alan called himself lucky in the above case because he was able to obtain all the information from one particular database. XA maintains two main databases of sales information. The CTD (Customer Transaction Database) is compiled from the flight coupons that are detached from the air tickets, which contains detailed and accurate information of the company's sales. The LYNX database is compiled through the reservation system, which has more recent information than the CTD, but its accuracy is lower. However, LYNX is more user-friendly to people who are less familiar with advanced computing, whereas the CTD can be searched only through complex SQL

[4] Airlines give customers discounts by offering a discount to sales agents who then pass a percentage to the customers. The reason is that fares between destinations are regulated by intergovernmental agreements, which are imposed on airlines.

routines. Because of these reasons, LYNX is more popular with the managerial staff who, very often, require only an approximate measure of the company's sales. Alan commented that:

> '....I can talk to LYNX in English [by which he meant that the search language is very English-like], and it is easy to access [from his PC]. Sometimes you can have problems trying to get the format right, you may have to meddle a bit, but I don't mind because I can get information exactly in the way [format] I need....'

Not every person can use LYNX to the extent that Alan was capable of, although the company has provided formal training to most. What they required was an experienced-based knowledge more than attending a course can give, but not everybody had used this system frequently enough to gain that experience. Therefore, only a subset of its users were competent enough to assign it as a source of secondary information.

5.2.2 Alan's Initiative to Refine LYNX Outputs

Very often Alan has to take the output from LYNX into meetings and discuss them. He had experienced a few problems in the past in using these outputs in their raw form because, although Alan had become familiar with LYNX, many others were far from understanding this coded information. Alan always sends the material to the other participants well in advance of the meeting, but he often found people arriving at the meeting with 'zero understanding' of what is going on. Therefore, the first part of a meeting is usually spent on 'doing the groundwork', which Alan considers 'a waste of my time'. But, on the other hand, Alan is sympathetic to the situation faced by his colleagues.

> 'These people are busy doing their job, just like me, and when they get my stuff on the desk what they want is to read and understand [it] straight away. It is not easy to catch me on the phone all the time, most of this stuff is difficult to

> discuss over mail [electronic mail]. I can understand why they give up and turn up naked to meetings'

The problem here is that although Alan sends them the necessary data, this material was not adequately customised for their immediate interpretation. Alan discovered later that each participant carried their own perspective regarding the problem, therefore required some specific information. The best means of achieving this was to discuss the data with Alan, but this was not always possible.

However, on realising this problem, Alan put some effort into improving the material that he sent out prior to meetings. He assigned this to an undergraduate trainee who worked in the department during the summer. These improvements comprised replacing part of the coded language with their detailed descriptions and summarising some of the data into graphical representations. These efforts did not solve the problem completely, but Alan noticed some improvements in communication. However, he knew the problem would return at the end of the summer when the trainee was due to leave, therefore he referred the problem to John, an Operational Research Consultant assigned to the Strategy department. The request was to automate the process that was carried out manually by the trainee. In a later interview, John made the following comment about Alan's request:

> 'We get many requests to automate things, but we have to be very careful here. I told Alan it is not easy, and I think it is not worth doing. People don't realise, their processes are not standard in all cases, you find small differences, and it is very difficult to capture those in a computer program....What happens is, we design a software, we ask them to use it carefully, but after a while people hand over the responsibility to the software, that means to us. We have been criticised so many times....'

Following John's advice, Alan himself automated the process by using a spreadsheet package. This provided a reasonably refined output, but not as refined as the one produced by the trainee undergraduate. However, the time Alan had to spend refining the material on each occasion was affordable to him. Alan discovered later that,

although his efforts served the purpose reasonably, it still did not help people in fulfilling some of their information needs. Alan commented that:

> 'I don't know exactly what other people need, and I'll be doing nothing but providing information if I try to find out what exactly each person needs....put it like this, I know what I send is too much for some people and may not be enough for others. In fact, it is their responsibility to find information they need. I only prompt. But unfortunately it is not that easy in here to get back to the source, so we have to live with what is given to us'.

Alan's above initiative can be compared with Michael's (XD) initiative of putting additional information on the company's computer network. However, Alan's objective was to *customise data* while Michael's objective was to *avoid customising data* and instead provide secondary information explicitly. It can be seen that both these initiatives were not entirely successful, but people at XD carried the advantage of having the opportunity to interact with Michael while those at XA had to live with what was given.

Alan noticed that some people were not concerned about the recipients of their data in the same way that he was. He sometimes became irritated when he had to deal with certain departments in the company. He emphasised that the reason is not with the personnel involved, but with the 'way things are done'. By this he referred mainly to the routines. Each department has its own format of information and specific terminology that have been established informally over time. Some people translate these into understandable forms when communicating with other departments. But, there are many who do not give much consideration to such issues. Alan commented about two specific departments where he often found difficulties in communicating:

> 'Network Development and Marketing speak only Excel [he referred to Microsoft Excel spreadsheet software]. If you ask for information, they will send you a spreadsheet. If you tell them you don't understand, then they will send you another spreadsheet. There is only one guy in whole Network Development who speaks English [he meant communicating in understandable

> form], he does the North American region, but I go to him for everything. I am not complaining about people, please don't get me wrong, it is the routine'.

Alan often found himself in situations where he was trying to make sense out of the information sent by the above departments. The little exposure he has had to this information during the past has been inadequate to understand the underlying philosophies. Therefore, the quality of his interpretations was sometimes inadequate to arrive at sound strategies. The time has always been a major constraint. Sometimes the facts receive their correct interpretation only in discussions during a decision-making meeting, and Alan had experienced situations where his pre-proposed strategy had become inappropriate:

> 'I don't have to know exactly what is happening in other departments. Most of all, I don't have time for that. By reading their information, I am not trying to learn what they are doing. I am trying to understand my problem. I look at all information through my problem, and I think that is why everybody likes to get information in the way they want. I am sure you understand what the real problem is....we don't have time to stop and think about other people's problems, and I strongly believe [that] each person is responsible for finding their information, but it is everybody's duty to help everybody in the best way they can....'

It can be seen that having a shared understanding when transferring the data would be an important enabler of contextualising. However, the achievement of such shared understanding is beyond the expectations of a large organisation like XA. Alan's comment highlights the fact that people had often been too busy to give consideration to the specific information needs of the other. Although he stated that each person is responsible for finding his/her information, this becomes possible only if the others were also concerned about it. One suggestion had been to change the culture of the organisation. Many people including Alan think that now is the right time to be more informal in terms of interdepartmental communications. However, certain others have questioned the sustainability of such change without closing the gaps of physical dispersion. Their concerns are on building trust amongst people beyond what is attributed by the bureaucracy.

An alternative suggestion had been to further improve data handling capabilities of people through the development of better tools. The problems are referred regularly to the operational research teams, but they are not considered as important projects. Alan said 'we need good tools to extract what we need from data pools without troubling people too much'. But, operational research personnel point out the evolution of business processes, and hence the data, to argue that any software product designed to 'dive' into data would become obsolete too soon, and would not provide the right depth of information.

Described below are four separate incidents that further highlights information-seeking, the aspects of contextualising and the obstacles in the channels of secondary information.

5.2.3 Case 1 : Evaluating the Quality of Service Index

The software produced by the Operational Research department to evaluate the Quality of Service Index (QSI) was a typical example of an unsuccessful attempt to automate a complex task. The failure of the QSI software can be described as due to not providing a channel for secondary information.

The QSI was developed for the purpose of evaluating the transfer-passenger propensity to the airline. Transfer passengers are those who change aircraft at some intermediate port before arriving at their destination. For example, a passenger travelling from Paris to New York who changes aircraft at London becomes an international transfer passenger at London. The volume of international transfer passengers through London has been growing steadily during the past few years, and in 1996 represented 33% of the total passengers in London.

Transfer passengers represent an important market for XA. They provide the opportunity for the company's further growth in the long term, and they can be used in the short term to fill unsold seats in flights. The trends in the long term can be

estimated statistically using econometric methods, however the propensity in the short term is more complex to estimate. In this latter case, it is important to understand people's behaviour in selecting amongst the different alternatives that are available to make a journey. That means, an airline has to estimate its competitiveness among the other airlines, considering many aspects of a journey, including the price.

The project of developing the QSI was assigned to Lester, an operational research consultant seconded to the Strategy department. He was driven by the fundamental question 'what makes a person select XA and fly via London rather than selecting any other alternative route?'. Lester found that the answer to this question has many attributes, but different personnel within the company emphasised only a subset of these. For example, Alan emphasised only the price and the total flying time, but Ian in Revenue Management additionally emphasised the total number of stops. Therefore, Lester came up with the need for consolidating these different ideas that were scattered around the company.

> 'I interviewed all the guys who had some knowledge or it is better to say who had some interest in the transfer passenger market. There is no single way to judge, say the behaviour of a passenger, and that is what I saw as the main problem here. People look at transfer passengers from different angles, they have experience only in certain aspects. I called them *attributes* in my formulae. What I did was combine all these scattered views into a single formula, and I think that is very good knowledge management'.

Lester encompassed all the attributes of transfer passenger behaviour into a single index known as the Quality of Service Index (QSI). It was calibrated using complex statistical techniques. Subsequently, the QSI was built into software that was available to all in the company. The user had to specify only the originating port and the destination port, and the software obtains all the information from online sources and calculates the QSI for all the different alternatives available to a passenger.

The QSI, however, did not become the ultimate tool for assessing transfer passenger behaviour, despite efforts put in by the operational research team. Its usage was

surprisingly low, for example, Alan used it only once since it was introduced nine months previously. Lester commented, 'we are going to improve it, there are other attributes which we have not taken seriously'. Despite Lester's views, the problem was not in the accuracy of the index, but in the depth of information it provided. The QSI software had two main problems:

1) The concept of QSI was opaque to most of its potential users. For example, the following comment was made by Ian, an executive from the Revenue Management department:

> 'I have to make crucial decisions about fares and discounts. Sometimes I have to discuss with Marketing about promotions, you know these special offers you find everywhere.....I am not very comfortable to base my decisions on this QSI because I am not very sure about it. I mean, I was OK with my own assessment, but it takes time, that is the problem, and may not be very accurate, but still it is OK. The QSI is fast, I am happy with that, but I need to know what is going on, I can afford to compromise on the accuracy'.

The problem Ian had was the insufficient insight given by the QSI. The system allowed only very limited interactions with the user, thus for many users it was difficult to obtain a great insight from the few numbers that appeared on the computer screen. Also, the user did not have any control over the computational process, in particular, control over the attributes that are used in the computation. The users did not agree on the importance of certain attributes in the formula, which they considered as too many and confusing. For example, Alan believed that price and total flying time is adequate for a pragmatic estimate.

There were certain other attributes that were not in the formula. The reason for such omissions was the difficulty of quantification. For example, trends in tourism, special events at the transfer port, etc., are important determinants of transfer passenger behaviour, but difficult to quantify. However, these were taken into account previously by people in their own estimates. Ian commented:

> 'it is difficult to modify the QSI with all this other information we have. QSI is a number, and we have these other facts and opinions which are not numbers, they are just like apples and bananas....so it is either you take the QSI or just leave it completely and go by your own method....'

2) The QSI did not reflect the changes in the data and the process as perceived by people. The reason for this was the complexity of the calibration. Each user had his/her own view about the effect of each attribute, but coefficients given by Lester's calibration were significantly different to what some users would have expected. He commented that:

> 'Some people don't agree with my coefficients, but this is what you get in the calibration....one of the guys made a big argument that price changes should have more effect, but I don't agree with him. What we have done is very scientific....'

Lester subsequently decided to prepare a document explaining the entire calibration process. This was well received by all the users as it gave them enough knowledge to decide either to continue using the QSI or to give up and revert back to their own estimate. Ian made the following comment about Lester's document:

> 'I found quite a few assumptions in the formulation. I felt [that] they have done this just to complete the formulae and may be they wanted to produce clean software. But, people like us have lots of experience and we are very sensitive even to these little things. You can't just get away by showing us a complicated formula. Some people have this wrong idea, they think what we need is posh-looking software. Wrong!! Completely wrong!! They [operational research team] should have given us more control over the formula, left the assumptions open so we can decide. That way they could have produced more customisable software which people would have preferred better'.

It was seen that although the QSI software was capable of providing the data relating to transfer passenger behaviour, the recipients of this data did not have any means of contextualising it because the system did not provide any provision for secondary

information. People did not see 'information' in the data because they did not see how this data related to the situation in the real world as they perceived it. In particular, the explicitness of this relationship has been drowned in the complexity of the calibration, therefore the users naturally perceived it as opaque. Therefore, provision for secondary information would have enabled the user to explore the computational process with more control in making assumptions. In that way, the user would have assigned meanings to the numbers that appear on his/her computer screen. This project can be described as a failed attempt to impose a standard upon experienced decision-makers.

5.2.4 Case 2 – The European Strategy Report

As the European Union emphasised the creation of a truly European air travel industry, XA had to formulate an appropriate strategy to meet the new challenges. This task was assigned to Rod, another senior strategy manager who worked beside Alan in the Strategy department. The objective of this project was to review all XA's operations that involved Europe in the light of future changes within the region, and propose an appropriate strategy. Rod was currently involved with the American region, but he had had long experience previously in Europe. Alan's input to this project was limited due to his work load.

In this project, Rod found he had to fight against time and complexity more than any other thing. He had just over two months to produce the first draft, and he had to have a clear understanding of all the proposals that are to be made. The information he required ranged from pure numerical facts to expert opinions, which resided within numerous internal and external sources. Rod had two junior staff working full-time on the project. However, soon into the project, he saw the complexity involved in obtaining the information from the company's central databases, therefore he had to exchange one of the junior staff with someone else who had more experience in working with databases.

One important item in the report was the transatlantic transfer passenger market, which had shown further growth opportunities for XA. Rod's experience suggested that this market had become increasingly competitive during the past five years. This was confirmed by an investigation of fares on all the transatlantic routes, which showed a continuous fall during the five year period. Rod interpreted these results in light of his own opinion. However, in the week before the submission of the draft report, Rod received a contradictory opinion from one colleague in his network, which suggested that *certain* transatlantic routes have become less competitive during the past few years. He did not receive adequate 'hard facts' to support this opinion except for a table of summarised air fares. He could not see a clear resemblance between these data and his initial investigation, but Rod was stimulated by the reliability of the source. Therefore, he decided to carry out an investigation to understand these data using raw data in the Customer Transaction Database (CTD). However, the CTD is too small to hold several years of data online, therefore Rod had to use a few easy-to-use summaries produced by the Information Management department. A single summary did not exist that provided all information he required. Even using the summaries was a complex and a time-consuming task. Firstly, the data in summaries had to be filtered using SQL programs, and then the filtered data had to be downloaded into a PC. The analysis is carried out on the PC using more flexible programming tools. Rod estimated that it would take at least three days to get five years of data into the PC. It was clear to him that he would not be able to get sufficient facts before the submission date.

> 'We were in a mess, the transatlantic market is something that everybody [was] waiting to see, it is so important these days....Tools we have were so rigid and user-unfriendly, I realised it very well this time....at the end I dropped it from the draft and said pending ha! ha! ha!....'

> 'These tools could have been enough if we had enough time, but in situations like this we need right kind of information, for that we need better data-handling tools, I mean, our data is very rich but what is the point if you can't get the right information at [the] right time....'

Before 'dropping' the above item from the draft, Rod made one attempt to obtain a reasonable insight into the matter. He instructed his assistants to download the data from the CTD. In their analysis of these data on the PC, the assistant noticed that although the gross fares have continuously fallen, the discounted fares have increased on some of the routes. This result showed some support to the new opinion, but Rod did not wish to take this evidence naively because there were other factors that could have influenced the discounted fares. He did not have enough time to carry out a complete investigation. Therefore, Rod tried to search for reinforcements through personal opinions so that he could propose a reasonable strategy. However, within the available time he was able to speak to only two people who did not offer adequate assistance.

> '...I didn't want to propose anything without the complete picture, it could have been very bad on me. We needed loads more information, some from OAG[5], which we couldn't get in time....There was one person who could have helped me but he had gone to Vancouver....so at the end we dropped it'.

In answering the question 'why didn't you e-mail him?', Rod said 'you can't do these things with e-mail, you need to talk face-to-face....this is a European strategy my friend....'. However, the investigation did not stop even after the submission of the draft. More data were collected, and within a week Rod was able to make sense of the data provided by his colleague and formally support his opinion that certain transatlantic routes had become less competitive while a majority had become increasingly competitive. He received substantial help from the junior staff who worked with him. Rod appreciated their effort, however he also made the following comment:

> 'It would have been very difficult without my young colleagues, I mean, they did most of the work. I knew the subject very well, they didn't, but I was so dependent on them. I could have saved some time if I knew all the tricks, but our systems are not designed for poor guys like us'.

It was seen that at the beginning Rod had faith in his knowledge about the transatlantic market. He perceived that his knowledge was well developed, therefore needed only clarification. Not only that, Rod was familiar with the kind of data in the CTD, which he learned from his previous work. Therefore, his initial adaptation of brief interactions with the CTD was due to the fact that he perceived to have contextualised the data at the outset of the interaction. That is, Rod knew how to use the data from the CTD to support his own opinion even before accessing the CTD.

However, the nature of his problem changed at a subsequent stage when he received an alternative opinion, and Rod then perceived the need to re-construct his understanding about the transatlantic market. Here, Rod experienced fuzziness, which was caused by the combination that the new opinion was incoherent with his established view, but it came from a reliable source. Rod's problem was that he could not use his knowledge to contextualise the little data he received to support this alternative opinion. Nor could he have further interactions with the source. Therefore, his subsequent efforts can be viewed as a search for the secondary information from the alternative sources that were available. It was seen that Rod's project team carried the required technical knowledge to create a source of secondary information out of the CTD and the other computing facilities, but their progress towards the deadline was obstructed by the inefficiencies of these systems.

It was observed that the company was aware, to some degree, of the difficulties that people encounter in their communication. Because of this, the company has made formal emphasis on training people to use technology as an alternative means of acquiring information. Also, it was fairly easy to get a person from the Information Management department allocated onto a project as the way Rod did in his project. However, people often have to struggle when they are alone because, unlike at XD, people at XA have a distant relationship with their Information Management department.

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[5] OAG – Official Airline Guide. This body maintains a complex online database of all airline information around the world including their timetables and capacities for approximately ten years.

5.2.5 Case 3 – The Weekly Briefing

The Strategy department has a routine of briefing important events to all its staff on a weekly basis. This is done in the conference room where all the staff assemble, and usually about two items are briefed every week. The objective of this is not to communicate detailed information, but to develop an awareness within people and to receive some feedback.

At one such meeting, Rod was asked to present some items of his European strategy. The report was in progress at the time, therefore Rod's memory was 'fresh', however he made careful preparation as it was an opportunity to make an impression on everybody. In recent months, one particular event [not mentioned here] had developed mass interest within the company, but Rod had not addressed it adequately in his report at that moment in time. Yet, he did not wish to omit this from the briefing, therefore he decided to speed up the process. With the help of his assistants, he was able to find most of the important information except for two things. These were, firstly, some information from the Strategic Relationships group, and secondly, the macro economic review produced by the senior economist in the Strategy department. The latter is produced monthly, and the next one was due just after the briefing. Therefore, Rod decided to use the previous month's review assuming no radical changes in the economic environment. However, he notified his intention to the senior economist, James. Rod made the following comment:

> 'Jim is not the easiest person to ask questions, he is not a bad person, but I don't feel very comfortable with him, you know what I mean?. I didn't want to ask him to bring his review forward just for me, but I just told him [that] I am going to use the old one. I thought at least he would tell me if there was anything wrong. You know what happened? The day before my briefing he send me the draft review, and it was so confusing. I mean, I couldn't think whether it actually affected my proposals or not....'

The situation Rod encountered was that the information he received was too general, and showed no specific relationship to his problem. Because the information was

received on the day before the briefing, Rod perceived he would not have sufficient time to understand these adequately in the context of his problem.

> 'I managed to catch Jim only once, just for a few minutes, and I don't think I made my point clear enough....But, later I saw Shareen [Jim's assistant], I was very lucky, we had a long chat and I gathered I didn't have much to worry about...'.

However, Rod put some effort subsequently to learn about the situation in more detail, as it was essential for him to know this to produce his report.

> 'Jim's review wasn't that bad, there was nothing strange in it, I guess it was the situation. You know, when you get your paper in the exam you always feel it is more difficult than all past papers you have done. I gathered this was quite similar. I mean, it is obvious [that] Jim can't write his review thinking about everybody's problems. But the thing is, we should have a system, some mechanism, to get our doubts clarified. This is not an exam, this is real life. I guess we are too formal in that sense'.

In contrast, Rod did not experience this problem with the information he received from the Strategic Alliances group, despite it being received last. The reason was that this information provided an answer to a specific question raised by Rod, therefore it was the 'right kind of information' for his problem.

> '[The] company spends loads of money to provide us information, but you ask anybody, you will hear complaints [that] people don't have enough information. It is true, what we have is data, I don't call that information. Information is different. Now take Jim's report [he referred to the macro economic review], the one I mentioned earlier, that was data, later it became information....But, that didn't happen automatically, people need help, help to get information they need from these tons of data. Especially when time is running out....When you don't have too much time to think....Our set up here is not the ideal for that'.

It can be seen that Rod experienced the fuzziness because his trust was combined with the perceived incoherence of the information. Although Rod did not expect the new economic review to be drastically different from the previous one, clearly he did not have adequate knowledge to contextualise the data it provided. However, in his interaction with Shareen, Rod did not discuss issues in this new economic review, instead he discussed his problem and sought opinions in the light of this document. Rod's reason for this was that although understanding the economic review was important to him, it was not permitted at that time because of perceived time-constraints. It can be seen that Rod did not interact with Shareen to contextualise the data in the review document, but to acquire the data that was contextualised to his particular problem.

However, Rod's experience in this incident can be described as *lucky* in the context of the communication culture of this organisation. It is usually difficult to have such detailed discussions on an ad-hoc basis, and this opportunity can be ascribed mainly to Shareen's flexibility and attitude. The reason for Rod's comment above: 'people need help' was that, in this environment, the help is too formal so that it does not often lead to what is expected. Therefore, people were often left with just the data, without being able to contextualise it into their problems within the available time.

5.2.6 Case 4 – The Business Information Centre

The Strategy department maintains a library, which is known as the Business Information Centre. This is located in a single room, not too large, but well organised. It holds books, periodicals, and various other forms of documentation relevant to the transportation industry, particularly to the air transport segment. It also provides online access to databases maintained by the Official Airlines Guide (OAG). This information centre has a high level of usage within the Strategy department.

The information centre is managed and maintained by two assigned members from the Strategy department. They are expected to put approximately thirty percent of their time into managing the library, and the rest to the other ordinary activities within the

Strategy department. Their work within the information centre consisted mainly of cataloguing, but often they are requested to obtain specific information from outside bodies. However, they accept these tasks only if the requested information has been published.

In 1997, Amal was assigned to manage the information centre because one of the present staff was requested back into a specific project on a full-time basis. Amal's history at XA was short. He had joined the company two years previously, leaving the banking industry where he had worked for six years since graduation.

Within the first month in his new assignment, Amal saw the level of the service that is offered by the information centre is far less than it is capable of providing, despite its high level of usage. He argued that this library is very much a *data centre* rather than an *information centre*. However, this argument was valid only regarding one category of its users.

> 'Most of the people who enter this room come in here searching for things [which] they need in their jobs. [But] some people come here just to find out what is going on, general stuff. Come after lunch, you can meet some strange guys. Its amazing, there are two or three guys who just like to browse [in] databases, read time tables....not the normal stuff....We have to cater for all these people, but I think we are not giving enough support to the first category I mentioned. I think we supply them only data, not the information they come looking for....'

Amal referred to a specific example which inspired his views about improving the service at the information centre. One of Rod's assistants needed information about trends in tourism in southern European countries to help prepare the European strategy. The library holds a series of publications by the World Trade Organisation (WTO) that provide detailed statistics of tourism around the world since 1984. Amal said, 'theoretically, we had all the information Rod needed'. But the information was required so urgently that Rod's assistant decided to take only the summary opinion produced by an analyst, despite the fact that it referred only to a few years of data.

Amal was sympathetic to the situation, and made inquiries from the previous managers of the information centre to find someone who has used the same information before. This inquiry revealed the details of a study carried out in the previous year by an MSc student on behalf of the senior economist. By following this link, Amal managed to obtain a report from this study, the contact details of the student, and also the details of a few other people within the company who had some knowledge of the subject.

> 'Rod came to thank me personally because that was a good service I gave. That report was amazingly good, the guy had practically typed all the numbers from OECDs [he referred to the WTO statistics] into the computer, it had some fine information [which] you can never guess by looking at the numbers. It was just the thing for Rod's project....But that was going out of the way, not my job really. What we normally do is, say, hi! Rod, OECDs are there, please sign if you want to take them out, end of story....to be honest, [the] guys here don't care to know whether people found their information'.

As a result of Amal's effort, Rod's team received a fine insight into WTO statistics within a reasonably short period. They were unable to contact the person who carried out the previous project, however alternatively they were able to consult a person within the company who had used these findings before. Amal said, 'Rod wouldn't have gone that deep if we hadn't helped'.

Amal was stimulated by this experience. He subsequently submitted a proposal to one of the senior managers to improve the service at the information centre. In this, he suggested allocating himself full-time to the library. This was not granted, however senior management agreed to increase his involvement with the information centre to around sixty percent. Amal introduced a new system where he started to maintain records of information usage. This was not an easy task as only a few people proactively entered their information usage into the system. Amal questioned people whenever he saw them repeatedly referring to the same material. 'It was not perfect, but we managed to keep some useful information' he commented. Furthermore, he put effort into creating links to other similar sources of information within the

company, compiled a list of contacts for various subjects, and also compiled a list of web sites of commonly-used information.

> 'My aim was to create a system here for people to go beyond the data [which] they see in our material. The fact is [that] the data we have in this room has been used before by several people, [for] various purposes. So, why not use these interpretations....it is very useful if you don't have enough time to do your own....Next step is to put this database on the network and get people to fill their own experiences, but that is too big, I can't see it happening in the near future'.

Amal's efforts were appreciated by many in the Strategy department. His system enabled some people to have in-depth interactions with some of the information held within the library. These interactions often involved sources outside the library, even external to the Strategy department. However, Amal found that the capability of his system was constrained by other organisational factors. For example, although the system revealed relevant sources outside the Strategy department, on many occasions it was impossible to contact them within the available time period.

> 'The problem I found was, what people find through this system is not the *ready knowledge* for their problems. They have to have some sort of interaction, only then the right information appears, but getting that interaction is beyond my system....It is difficult to provide people information without knowing their problems, sometimes the problems are not very clear. So, things have to be sorted out in some kind of [an] interaction [between the problem holders and the sources of knowledge]. I think pre-packed information can do only little'.

Amal perceived that the solution to this problem could be a company-wide knowledge network. But, Amal himself was not certain of the cost-worthiness of such a system without transforming the organisation culturally into a more organic state.

Amal's initiative can be described as trying to prevent people from re-inventing the wheel. Its objective was to direct people to the potential sources of secondary information particularly when they were under time-constraints. Amal argued that

there could be someone, or some document, to help people in contextualising the data even though these secondary sources have emphasised different aspects of the same data. This concept was proved to be true in many situations like the one encountered by Rod. However, its implementation as a useful system for the decision-makers was not entirely successful. The reason, Amal discovered, was that although the system directed people to potential sources, the actual interactions with them were governed by the communication culture that existed broadly within the organisation. Despite that, the system had shown some success when it pointed at sources that were reasonably known to the user.

Furthermore, this system can be closely compared with XD's on-line catalogue because the latter provided a similar service of pointing at the potential sources. However, its higher usage compared to Amal's system can be ascribed clearly to XD's rich communication culture.

5.3 Summary and Conclusion

5.3.1 Another Data-Rich Environment

Similar to XD, XA too was a data-rich environment for decision-makers with inefficient search-supply mechanisms that provided data to individual members. This environment was however different from that of XD in many aspects. A key feature was the severe lack of commitment shown by people to provide data to suit other's requirements. The reason was that people were culturally less obliging to help, and did not 'stop and think' about other people's problems. Hence, people were acting on their convenience when providing data, which often resulted in 'data dumping'.

XA's business environment was much turbulent and dynamic than that of XD. Not only its clients and competitors behaved dynamically but also industry structure was in transition at the time of this inquiry, and the company's internal response had to meet this change. This was reflected within Strategy department as high degree of novelty in their tasks, hence the inefficiencies in search-supply mechanisms were pronounced more than at XD.

Furthermore, people at XA had been trained formally in data handling tools, therefore they were more competent than those at XD in exploring explicit sources of data. But, at the same time, XA's data sources were much larger and complex, and required better handling capabilities than those at XD.

In general, XA's information-seeking environment can be contrasted with that of XD on the basis that customisation of data was inferior. Therefore, people at XA were in a constant search for secondary information.

5.3.2 Nature of Information-Seeking Function

Unlike at XD, people at XA were offered only little opportunity for adopting exploratory interactions on an ad-hoc basis. One main reason was the lack of

informality in people's domains of interaction. For example, meetings at XA were generally too formal and had to be arranged well in advance to fit into people's schedules, which contrasts with XD where it was much easier to meet people on an ad-hoc basis. Furthermore, people's experience on technology was often inadequate for in-depth exploration of explicit sources, even though they had been formally trained to use technology.

Because of the above reasons, people at XA had only little opportunity to emphasise contextualising to be concurrent with data acquisition. Hence, information-seeking at XA often comprised *two explicit tiers*: data acquisition followed by secondary information search. Unlike at XD, people did not bother too much with merging these two activities because they were aware of the limitations of their environment. However, people often tried to simplify their tasks through assumptions, and therefore tried to rely on shallow interactions. However, people found in many occasions that data in their environment was complex and often unstable in terms of structure and references, which led shallow interactions requiring subsequent contextualising.

People at XA were aware of friction in the flow of secondary information in their environment. This has often led people not to choose best sources of data because they speculated it would not lead to useful information within the available time. Instead, people preferred using alternatives which they believed they could contextualise to meet time-targets. For example, people found 'information bartering' through personal networks a better way of obtaining data even though this information often lacked the comprehensiveness provided by a formal source of data.

Hence, friction in secondary information flow at XA has left its rich data resources under-exploited. Even though the company spends large amounts on technology, people perceived these as 'data systems' rather than 'information systems' because only little emphasis has been put on the aspect of contextualising. People at XA were often compelled to ground their decisions on information that is sub-optimal but still accessible to them at that particular time.

5.3.3 The Next Chapter

Chapter 6 that follows will develop conceptual frameworks from descriptions presented in these two chapters (Chapters 4 and 5) by examining the relationships amongst concepts at more abstract level. These frameworks might lead to a descriptive theory that gives insights into people's information-seeking function and their contextual aspects observed in these two preceding chapters.

Chapter 6

Emergent Conceptual Frameworks

6.0 Introduction

The previous two chapters looked at people's information-seeking function within empirical contexts of organisations XD and XA, and highlighted several concepts and phenomena. The objective of this chapter is to describe the development of theoretical frameworks from these concepts, phenomena and their interrelationships, which might lead to a theoretical perspective of the information-seeking function and its contextual aspects.

These conceptual frameworks are developed based on three main phenomena that emerged from Grounded Theory analysis of empirical investigations at XD and XA, which also lead the structure of this chapter.

- Firstly, it was observed that people could not always acquire perfect data from information sources, appropriately customised to their specific decision-making tasks. This caused *opaqueness* in data for people in the context of their task, which hindered their efficient interpretation to obtain useful information. It is suggested that the occurrence of this phenomenon was the combined result of both (1) inexplicit information needs of people and (2) inefficient information channels. Sections 6.1 and 6.2 of this chapter investigate above factors to suggest that opaqueness is generic within people's information-seeking environments at XD and XA.

- Secondly, it was observed that people had a natural urge to avoid and eliminate opaqueness, not only because they wanted to close gaps in their understanding of decision problems, but also because they wanted to avoid fuzziness in their already-developed understanding (see section 6.3). Therefore, it is suggested that people tried avoiding and eliminating

opaqueness through a proactive approach against lengthy trial-and-error sequences, which is known as 'contextualising'. Section 6.3 investigates this concept for its attributes and associated phenomena to suggest that information-seeking in organisations is better described as *acts* containing multiple interactions that serve data acquisition and contextualising.

- Thirdly, it was observed that data acquisition and contextualising were not sequential events, as one would have expected. They showed complex arrangements within acts of information-seeking, mainly because people tried to avoid opaqueness by *speculating* through their experience and pre-knowledge. Section 6.4 investigates these complex arrangements in the context of people's beliefs about their tasks, data and environments to suggest a framework that describes people's interactions with information sources.

Section 6.5 provides a summary and conclusion of perspectives emerged through this analysis.

The next chapter will conclude this dissertation with a highlighting of the contribution it has made to theory and practice of information systems.

6.1 The Nature of Task Environment at XD and XA, and the Nature of People's Information Need

Development of conceptual frameworks suggested in this chapter will begin by looking at the *nature* of people's *information need* that drove their information-seeking efforts, and how it related to the organisational context. These insights are drawn from two categories of concepts emerged from the Grounded Theory analysis that describe people's interpretation of the generic nature of 'problems' within task environments at XD and XA. It suggests that task-environments at XD and XA were dynamic; hence people's decision-making tasks were a combination of *continuity* from previous tasks and *novelty* from changing circumstances. This section therefore suggests that people's information needs were *not totally explicit*, however explicitness varied depending upon the nature of continuity/novelty that was found in a task. The next section will look at this partially-explicit nature of people's information need as a main factor contributing to a generic phenomenon known as *opaqueness in data*, which seems to have characterised information-seeking at both XD and XA (see section 6.2).

Organisations XD and XA were dynamic systems that operated within dynamic environments. They consisted of dynamic subsystems, which required continuous realignment for achieving corporate objectives. These realignments involved the efforts by people in the organisation who, either individually or collectively, intervened with those organisational subsystems at both pre-determined times and whenever they perceived they were needed. For example, Louise, the CBU director at XD, assumed responsibility for the continuous realignment of her business unit. She, together with her staff, intervened with the behaviour of this unit through a process of decision-making. One important aspect was that these individuals required predicting the consequences of these interventions. It was observed that people were required to have *developed knowledge* of the behaviours of these organisational subsystems and of various environmental systems that influenced the behaviour of their organisation.

Louise, in particular, claimed that she has developed knowledge comprehensively over the years through experience, which she used often to predict the outcomes of the company's strategies within her sales region. Her understanding of systems'

behaviour can be described as comprising a series of relationships amongst the various aspects her business environment such as the behaviours of competitors, the behaviours of health authorities, specific promotional events, various products and their growth patterns etc. Thus, Louise knew the behaviours of these systems through a set of input-output relationships. Similar to Louise, most other people at XD and XA claimed that they have self-calibrated the behaviours of systems with which they 'commonly associated', where they explicitly related the comprehensiveness of their knowledge to the degree of exposure, mainly to the lengths of their experience.

This kind of knowledge can be described more precisely as *mental representations*, or *mental models* of those real world systems that are associated by people. Huber (1990), for example, has stated that decision-makers predict temporal behaviours of their systems through the compilation of mental models. In the case of Louise, it can be seen that her mental models of the behaviours of her business environment is largely a natural result of her experience, and only little due to any explicit efforts.

However, despite Louise's lengthy experience within both XD and the pharmaceuticals industry, it was observed that she still suffered from a lack of knowledge when it came to decision-making. She *perceived* that her mental models did not provide adequate representation of the behaviours of both organisational and environmental systems that she associated in decision-making tasks. In other words, she perceived a gap in her knowledge. This was her *primary problem* regarding the decision-making task, and it often reduced her confidence in making judgements about the consequences of her decisions. Hence, Louise's objective in her search for information was to *restore* the mental model to some arbitrary level, which she perceived pragmatically as satisfying.

People implied that such gaps in their knowledge can be attributed to two main reasons:

1. People implied they could often 'lose track' of the evolution of their well-known and 'commonly associated' systems, which forces them to perceive that their well-developed mental models have become *incompatible* with the behaviours of systems in the real world.

2. People implied they often needed to associate new systems, and newer aspects of their 'commonly associated' systems, which forces them to perceive their mental models as *incomplete.*

Thus, the gaps in people's decision-making knowledge could comprise both above aspects in combination, and each exerting a different influence on the nature of their information-need. The following two subsections will provide further insights.

6.1.1 Evolution of 'Commonly Associated' Systems

For people at XD and XA, decision-making was a dynamic task that continued over time. They did not recreate their mental models at each and every event of decision-making; instead they often remoulded them from a previous event. It was observed that a large percentage of people's decision-making tasks associated only a smaller number of systems, which they *associated commonly* in the course of their employment. For example, a large percentage of Louise's decisions were related to the various subsystems within her business environment and the CBU, which she associated commonly in her various tasks. Because of these frequent exposures, people perceived to carry *'well developed'* mental models of the behaviours of these 'commonly associated systems'. Yet, they did not always 'keep track' of the evolution of these systems. Because of this, people on certain occasions, particularly when it came to decision-making, perceived that systems in the real world have evolved beyond what is reasonably represented by their mental models. Thus, people perceived that their mental models have become *incompatible* with the systems in the real world.

Louise experienced that all the systems she commonly associated with have evolved over time, but each had its own pattern of evolution. She observed the systems that related to the company's best-selling but mature drugs have shown slow evolution over significantly long periods, while some of the more recent additions have shown turbulent behaviours. Louise implied that she 'knows what is going on' with mature drugs where she could reasonably *predict* their reactions to the changes in the other parameters such as competitor behaviour and client behaviour. That means, although Louise did not 'keep track' of all the activities in the region, she perceived that she is able to predict the evolutions of the systems that involved mature drugs through her

existing knowledge. Therefore, when Louise interacted with the sales staff to acquire data she carried the default perception that 'I know the behaviour of mature drugs'. This often reflected in her preferences for brief interactions. In contrast, Louise perceived that she is *unable* to satisfactorily predict the evolution of systems that involved newer drugs in a similar way to mature drugs through her existing knowledge. Therefore, her implicit question regarding these systems may have been 'do I know their behaviour?', which carried a significantly higher level of unpredictability. This was indeed reflected in her requests for detailed interactions with sales personnel.

Louise's behaviour was contrasted to some degree by Andrew, the director of the Midlands region's CBU. Although Andrew was exposed to a similar kind of a business environment to that of Louise, he used telephone conferencing regularly to obtain data from the sales staff. Andrew perceived that the evolution of many aspects of his business environment carry significantly high levels of unpredictability.

Both Louise and Andrew were aware that the systems with which they 'commonly associated' are subjected to continuous *change*. However, it can be seen that their assessments of the *nature of evolution,* particularly when it came to decision-making, were different regarding each system. For example, Louise perceived that changes in systems involving mature drugs were more predictable than those involving newer drugs, but Andrew assigned a much lower level of predictability to both these kinds. Their perspectives on the *nature of evolution* in systems can be described with reference to the following framework:

- Soft change: People might perceive that the behaviour of the system has remained totally unaltered in the light of all known interventions, but the state of the system has changed due to the independent behaviours of its components. In such a case, people will perceive no reason to remould their mental models. However, people would perceive a need for *recalibrating* the mental model, therefore they would seek information in order to *retrace* the statuses of its components.

- Complex change: People might perceive that the behaviour of the system has changed in combination with the independent behaviours of its components. Complex change can range between predictable and unpredictable as described below:
    a. Predictable change: People might perceive that the new behaviour of the system is *totally predictable*. Therefore, people would perceive the need to *remould* their mental models, and they would perceive that it might be carried out through some specific information. Furthermore, similar to the case of soft change, people would perceive the need for information in order to retrace the statuses of its components.
    b. Unpredictable change: People might perceive that the new behaviour of the system is totally unpredictable. Therefore, they would perceive the need to *reconstruct* the mental model, but because of their familiarity with the system, they would still be able to specify the information-need with *reasonable* clarity.

Figure 6.1 below shows the bounded space of *perceived evolution* of 'commonly associated systems' as a triangle with nodes representing the above extreme states of change. It suggests that the evolution of real world systems is always *partially predictable* to people.

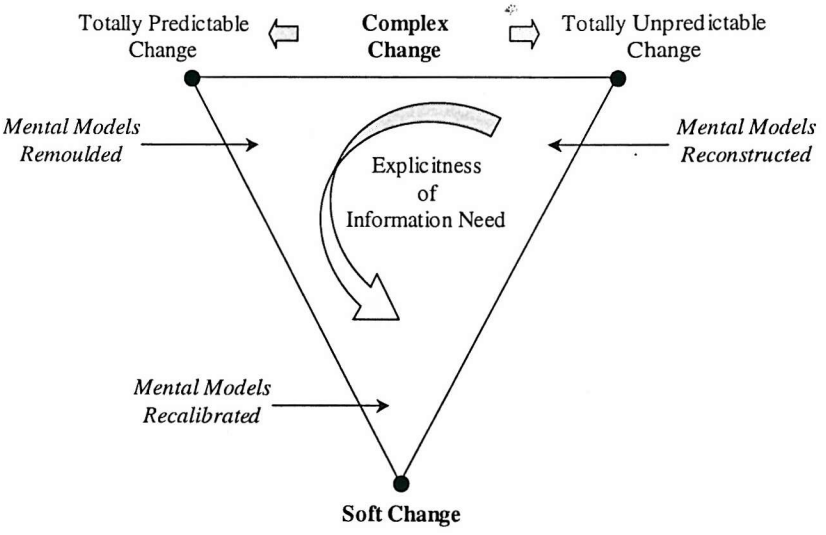

Figure 6.1 – Evolutions of the 'Commonly Associated Systems'

6.1.2 Exposure to New Systems

In contrast to the above, people were also exposed to *completely new systems* and also to the *newer aspects* of their 'commonly associated systems'. However, despite the novelty of this exposure, people usually made inferences to such unknowns through their existing knowledge. Yet people *did not perceive 'well developed' mental models* regarding these unfamiliar systems, because they were only able to *partially predict* their behaviours through their existing knowledge. Therefore, people perceived their mental models as *incomplete* when it came to decision-making.

Simon (the CBU marketing manager at XD) was exposed to some newer aspects of his sales region when he had to organise the special promotional campaign in the South East of England. He claimed that he had only a *rough idea about the information* that he required, until he met a few sales personnel on site. Here, Simon implied that his mental model of the behaviour of his sales region, from the aspect of such promotional campaigns, was incomplete.

Besides Simon's experience, the Business Intelligence Unit (BIU) at XD often noticed that people were compelled to enter less-known territories particularly during periods of rapid growth. For example, Tony, the product manager from the NHS team, found that information in the company's 'Brand Book' had limited use when it came to making non-routine decisions. Here, Tony was exposed to many unfamiliar aspects of his familiar systems, and he implied that his mental models were incomplete regarding many of these aspects.

The key aspect was that people could not describe their information need clear enough because, unlike with their well-known systems, people did not receive enough guidance from these unfamiliar systems. It was seen above that Simon's information need was unclear at the outset of his inquiry from the sales staff, and it gradually became clearer as the process of seeking information evolved. Similarly, people who approached the BIU for data could not often specify their needs accurately enough, and therefore people had to make multiple requests for the same task. Even though the BIU offered people its informal interactive service, they still returned with further

requests. These are clear examples of ill-defined information needs that have arisen from unfamiliarity in systems.

Figure 6.2 shows the combination between *incompleteness* and *incompatibilities* of mental models.

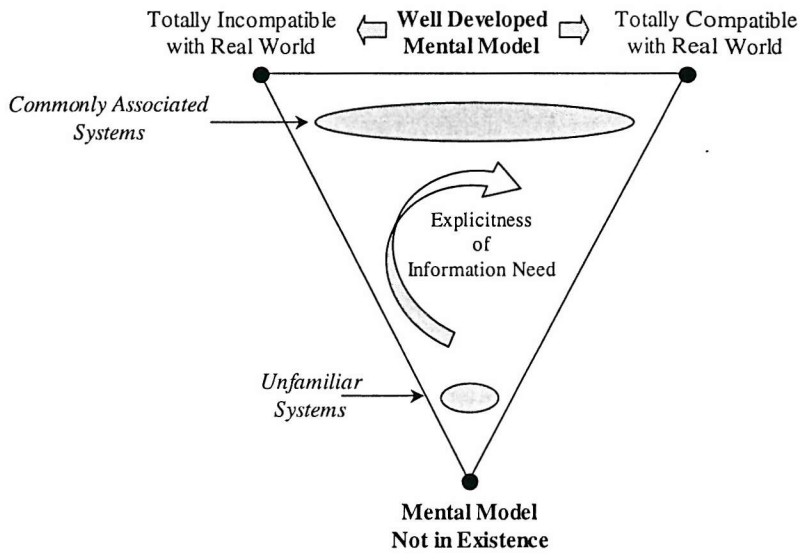

Figure 6.2 – The Combination between Incompleteness and Incompatibility

Thus, people saw their decision-making tasks comprising elements of both continuity and novelty. People generally found that continuity between tasks was not smooth enough to be depended totally on their existing knowledge, and therefore people had to update their mental models at each and every task of decision-making. At the same time, people were able to make inferences towards novelty in their tasks through existing knowledge, and this made them not having to reconstruct their mental models completely through acquisition of information. Hence, in real-life, people only had to *restore* their mental models at each task of decision-making, but the kind of restoration that required was subjective because the continuity and novelty in tasks were people's interpretations rather than objective properties.

Although it may be stated that people's information needs were defined by the kind of restoration that was required in their mental model, this does not help much in understanding their information-seeking effort. It was seen above that people's ability

to describe their data needs depended on, firstly, the assumptions they made about the kind of change that occurred in familiar systems, and secondly, inferences they could make from existing knowledge to reduce unfamiliarity in systems. People generally came up with relatively clear descriptions of their data needs when tasks were associated with their well-known systems, and particularly when the change was assumed predictable. In these situations, people perceived they 'knew what was going on'. In contrast, people could not generally describe their data needs clearly enough when tasks involved relatively unfamiliar systems and aspects.

6.1.3 Summary

This section looked at the nature of people's information need by conceptualising the nature of 'problems' that people experienced in their task environment. It saw that a task was associated with many systems. While some aspects of these systems were familiar to people because of the continuing nature of tasks, some were unfamiliar because of changing circumstances, and both were subjectively determined through people's experience and pre-knowledge. Consequently, the explicitness of people's information need was related to the perceived degree of continuity and also to the reduction in novelty they achieved through inferences made from experience and pre-knowledge.

6.2 Nature of Information Systems, and the Occurrence of Opaqueness in People's Data

The development of conceptual frameworks is continued in this section by investigating the nature of information systems environment experienced by people in their attempts to fulfil information needs. This investigation leads to exposing the generic phenomenon that will be known as *the opaqueness in data.* It will be shown throughout this chapter that opaqueness in data is a main determinant of the information-seeking process adopted by people, and therefore it is an influential factor that determines the nature of their information-seeking function.

The Grounded Theory analysis came up with two main categories of concepts relating to people's interpretation of their information systems environment. One category represented the view that environments were *data-rich*, which consisted of evidence implying that the volume of accessible data was so high that people had little trouble obtaining data. The other category however represented the view that environments were *inefficient*, which consisted of evidence implying that people did not always receive perfect data for their tasks that is customised appropriately for efficient interpretation. Therefore, people at XD and XA sought information in environments which they interpreted as generically *data-rich but inefficient.*

The next section (i.e. 6.3) will suggest that, as people have a natural inclination to eliminate opaqueness, which they encompass as part of information-seeking function, information-seeking is generically more than just data acquisition. It is suggested that data acquisition alone provides an inadequate representation of people's information-seeking function, which therefore requires a broader perspective.

6.2.1 The Aspect of Data-Richness

Over the years, organisations XD and XA have changed their communication technologies, organisational routines, cultures and physical layouts to improve connectivity to their decision-makers. And, as a result, the number of accessible data sources, both tacit and explicit, has increased dramatically while the time taken for a person to obtain this data has decreased. People compared today's environment with that of few years ago through statements such as 'Those days, much of this time was spent to get into the sources, get the information [data] you want, but now three times that data is given to you...'. These organisations can therefore be described as 'data-rich' because people implied they do not have too many problems obtaining data.

However, the data-richness was not experienced homogeneously by people within a particular organisational context. Andrew at XD was a typical example of someone who enjoyed an *extremely data-rich* environment. He had stimulated a 'talking culture' within his team so that he could access data at all levels, and he also maintained informal relationships with most of his colleagues in other teams. Furthermore, he carried technical knowledge to the extent of being able to 'surf databases'. Thus, it can be seen that the quality of Andrew's data-rich environment was *not objectively imposed* on him purely by the macro organisational context defined by parameters such as culture, routines, infrastructure, nature of business and business environment. It was rather 'constructed' through interactions among his personal qualities, team-cultures and macro organisational factors.

For example, the significance of personal qualities was shown in the comparison between data-rich environments of Andrew and Louise. Although Louise worked for the same organisation, and therefore influenced by the same macro context, her environment was different to that of Andrew's. The main reasons for these differences were that Andrew was a better communicator and stronger in technical knowledge that made him exploit data sources more effectively than Louise did.

In contrast to both Andrew and Louise, Alan at XA experienced a different data-rich environment. This difference can be ascribed mainly to the differences in macro context between the two organisations. Alan, for example, had access to more

explicit sources of data than people at XD had because XA's technical infrastructure was superior. However, in contrast, people at XA received little data through informal channels, which was due to its inherently poor communication culture. People at XA had been given only little opportunity to exploit their communication skills but more opportunities had been given to exploit technical skills. Alan, for example, was experienced in handling the LYNX and CTD, which provided him more data than to many of his other colleagues who did not carry the same technical experience.

It may therefore be stated, on the one hand, that a company's macro context can both support and constrain the exploitation of people's capabilities, which directly influences the data-richness experienced by people in their environments. But, on the other hand, a high degree of support from the macro context does not imply homogeneity in data-richness because it is still influenced by team-cultures and personal capabilities.

In summary, people interpreted data-richness as a fundamental aspect of the environment in which they sought information. This was seen as uniquely created by people through interaction with their immediate and macro environments.

6.2.2 The Aspect of Inefficiency and the Occurrence of Opaqueness in Data

Despite people's perspective of data-rich environments, the flow of data at XD and XA was not totally flexible. Even if people were able to specify parts of their data needs explicitly, abstracting this data from available resources was not always straightforward because people experienced many constraints that were inherent in their information channels. However, these constraints were not imposed objectively by the environment, instead they had been *created* subjectively through interaction between people and their immediate and macro organisational environments. Again, as with data-richness, the influence of personality depended strongly on the nature of immediate and macro environments, where some aspects of personality had been either dwarfed or enhanced by related environmental factors.

The Grounded Theory analysis exposed the following key factors as influencing people's information channels:

- *Lack of Communication Skills and Suppression by Organisational Culture*

People's ability to communicate effectively was a key factor that influenced the receipt of appropriate data from tacit sources. This aspect was seen, however, to have been influenced strongly by the culture of a person's domain of interaction. It was seen previously that Andrew exploited his capabilities more effectively to customise data within the context of XD than Alan could do it within the context of XA. Hence, it can be suggested that a company's macro culture has a general influence on the quality of data that people receive, but clearly this is further differentiated at the levels of teams and individuals.

- *Lack of Technical Capability and Inadequacy of Technical Infrastructure*

Company's technical infrastructure and people's technical skills were also interrelated factors that influenced customisation of data. Differences relating to this aspect were seen between Michael and Tony at XD. Michael who carried a reasonable technical capability was able to customise data from the company's brand book, while Tony had to depend on other people. However, Tony's technical incompetence was mitigated to some degree by the supportive culture that prevailed within XD. Tony did not therefore consider the brand book as an established channel of data to the same extent as Michael did because he had other means of obtaining data.

- *Inflexibilities in Explicit Sources*

Many of the explicit sources of data offered to people were fixed in presentation, which represented a clear cause for people receiving un-customised data. Typical examples include printed reports and other documents which were either distributed to people or kept in libraries. These usually took a broader focus than what people actually required in their specific tasks. Examples such as XD's weekly reports or XA's macro economic review can be described as rich sources of data, but they did

not provide these data in the way people wanted because they had not been prepared in focus with people's specific tasks.

People experienced inflexibility even with computer-based data. A main problem was their lack of technical experience, which prevented them from manipulating the data. XD's brand book on the intranet was a good example, which was customisable to Michael, but was just another fixed source for Tony.

- *Lack of Commitment by People to Customise Data*

People's lack of commitment to provide appropriate data was another main constraint observed in information channels. This was observed to be closely related to the degree of informality inherent in channels of information. People at XD were generally 'friendly and obliging' and showed more commitment than those at XA who treated supplying data as 'assigned duties'. Generally, people at XA were less aware of the applications of data that they provide to the others, particularly to people in other departments. Most of the time they were not interested in learning because it was too difficult to keep track of everything in a large and complex organisation like XA.

However, looking from a different perspective, people's lack of commitment was also influenced strongly by the fact that they were parts of busy organisational life, which gave them little opportunity to 'stop and think' about other people's problems. On many occasions, people acted on their convenience and offered what they had in hand without putting much effort into customising. For example, in replying to a simple electronic mail query, people sometimes attached a whole report on some other issue, which contained only a small paragraph relating to the query.

- *Lack of Standards in Data Transfers*

Interdepartmental data transfers were sometimes influenced by the lack of standards. For example, Alan (XA) experienced that people at Network Development subdivision followed personalised formats when providing data, which often led to

requiring more and more data. A main problem was that because these data were transferred at departmental level, it did not necessarily cater for people's specific data needs that have arisen from their specific decision-making tasks. These were situations where information systems have been defined by routines more than by people's needs.

Hence, although people at XD and XA saw their environments as data-rich, at the same time they were at a constant struggle to obtain data 'in the way they wanted' for their tasks. This was interpreted as *inefficiency* of their environment, which has been created uniquely by people through interactions with their environment. As a result of this inefficiency, people often received data that was *inadequately customised* for their specific tasks, where they could not see the full relationship between these data and the task in hand. Hence, people perceived that data carried some degree of *opaqueness* in the context of their specific task, which hindered their efficiency in interpreting the data to obtain useful information. This was a phenomenon in these organisations, which people tried avoiding, or at least minimising in their information-seeking activities.

However, the phenomenon of opaqueness did not emerge from those factors relating to information systems alone. It emerged as the combined effect of both (1) failure of people to specify their data needs explicitly, and (2) failure of information systems to provide the explicitly specified data needs. Hence, more precisely, we have ascribed the cause for opaqueness in data to inefficiencies in *search-supply mechanisms* that existed within people's own unique environments. That means:

- Firstly, it was observed in chapters 4 and 5 that a large proportion of people's information needs was subjectively determined. People implied their information needs were depended on 'what else has happened', which was mainly interpreted, and therefore specifying people's data needs objectively was not totally practical. Hence, *searching* had become an important part of *receiving* data.
- Secondly, it was shown above where mechanisms that presented data to people were operating naturally through people's interaction with their immediate and macro environments, which were therefore constrained by

factors relating to their personal qualities, team-cultures and macro organisational context.

Hence, the cause of opaqueness in data has two main aspects, which can be summarised as shown below:

The task aspect:

- People's information needs were not totally explicit, and therefore it was not always possible for them to raise clear queries when searching data.

The information systems aspect:

- People's communication skills were poor, or the company's culture did not support the exploitation of their capabilities.
- People's technical skills were poor, or the company's technical infrastructure did not offer sufficient facility.
- Data sources were inflexible in presentation.
- People lacked the commitment culturally, or they did not have time to 'stop and think' about other people's problems, and therefore acted on their convenience when supplying data.
- Data transfers lacked standards, or they were governed by routines rather than by people's needs.

6.2.3 Summary

This section suggested that information systems have acted to create *data-rich* but still *inefficient* environments for people. It further suggested that *inefficiency* combined with people's *inexplicit data needs* have caused *opaqueness* in the data they acquire, which is generic to information-seeking in their environment. The next section will look at how people act to avoid and eliminate opaqueness through a complementary phenomenon that will be known as 'contextualising', which leads to the emergence of two further phenomena.

6.3 Nature of the Generic Information-Seeking Function

Following from observations highlighted in previous section that people's information-seeking environments were *data-rich but inefficient*, this section brings in further concepts that emerged from Grounded Theory analysis to suggest that information-seeking at XD and XA was a two-tier process. It means that information-seeking consisted of two interrelated processes of (1) searching the data, and (2) avoiding and eliminating the opaqueness in these data due to inadequate customising. The analysis suggests that the latter is a *an auxiliary process* that people encompassed in their information-seeking function together with data acquisition, which was stated in chapters 4 and 5 as 'contextualising'.

It is important to highlight at this point that information-seeking function was described originally (see section 1.2) as consisting of two interrelated acts of searching for stimuli (data) and transforming stimuli into information. We now suggest here that contextualising is the process through which people prepare their minds for interpretation, either by *working to avoid* the occurrence of opaqueness *prior* to the receipt of data or by *working to eliminate* the effects of opaqueness *after* the receipt of data. Hence, contextualising is seen as an *effortful process* for people if interpretation of data to be effective and effortless. Importantly, therefore, contextualising associated a need for *secondary information*, which leads to the emergence of an important phenomenon where we suggest that people's original information need can expand as they progress through seeking information. It is the aim of this section to describe this phenomenon of contextualising and its associated *secondary information need* in order to describe the nature of the information-seeking function in above organisations. It leads us to expose the important concept of *information-seeking acts* that forms a basis for describing the nature of people's information-seeking interactions.

This section begins with inquiry into why people wish to eliminate opaqueness in data. It suggests that, apart from the explicit reason of restoring their mental models, people also have the implicit need of avoiding fuzziness in their mental models that normally result from data-richness of their environment. This section will then go on

to describe the phenomenon of contextualising, and finally to describe the concept of information-seeking acts.

The next section (i.e. 6.4) will further investigate this emerged concept of information-seeking acts, and the complex arrangements of contextualising within these acts, which will then lead to a theory about characterising people's information-seeking interactions and their contextual aspects.

6.3.1 Occurrence of Fuzziness in Mental Models

Grounded Theory analysis provided two categories of concepts that described the problems people experienced when restoring their mental models by integration of information.

It was often observed that people proceeded with making decisions even though they could not acquire all the information they hoped for. This was described in chapter 4 as 'fragmentation', which meant that information was incomplete but held sufficient coherence for a reasonable view to emerge from it. Louise (XD) described this through the analogy of the *jigsaw puzzle* in which she compared the compilation of a view from information to solving a jigsaw puzzle. People, including Louise, found they often made decisions based on incomplete jigsaws because they were pragmatically satisfying to them.

There were two main reasons for the occurrence of fragmentation:

- Firstly, people did not either receive enough data in relation to some aspect of associated systems, or have enough time to interpret the data. For example, Louise said 'I never get more than half the responses...' or Michael said '...may be you have the lot on your desk, but not enough time to go through all that...', which shows the voids in information caused by inadequate data and time.

- Secondly, people could not interpret the data within the context of their task because of the *opaqueness* in the data, and therefore did not receive information that is coherent with their task. For example, Rod (XA) said 'I couldn't think whether it actually affected my proposals...', which shows the incoherence led by inappropriate interpretation.

It was observed that inappropriate interpretation of data could lead people's mental models into another phenomenon that may be known as 'fuzziness', which exists in combination with fragmentation. Fuzziness occurred when the data were *believed to have related* to the specific system/systems concern, but could not be interpreted in the context of the task. As such, 'fuzzy', in this context, means 'incoherent information' coming from *seemingly valuable data.* For example, Louise (XD) said: '...but I still can't ignore the information...I have a respect for these guys...', which indicated the fuzziness caused in Louise by the incoherence of information received from some of the sales personnel.

A vital aspect of fuzziness is the element of 'trust' that is placed on the source of data by people. In the above example, the occurrence of fuzziness can be ascribed to the 'trust' that Louise had placed on sales staff where she was reluctant to exclude their data. Similarly, Louise experienced the fuzziness to a higher degree when the views of her favourites became incoherent with respect to her own views. Therefore, fuzziness is the simultaneous effect of *incoherence* and *trust*, where incoherence alone *may not cause fuzziness* if people could ignore information through prejudices about its source. An example of this can be shown from Ian's (XA) comments about the QSI: 'I am not that comfortable to base my decisions on this QSI because I am not very sure about it'. In this case, information given by the QSI did not agree much with Ian's own views, but it did not create much fuzziness in him because of the *limited trust* that he had placed on the QSI model.

Another important aspect of fuzziness is that it existed in combination with fragmentation. It was observed many occasions that the addition of data has caused fuzziness in people rather than helping them to reduce their fragmentation. This

relationship between fuzziness and fragmentation can be described using Figure 6.3 below.

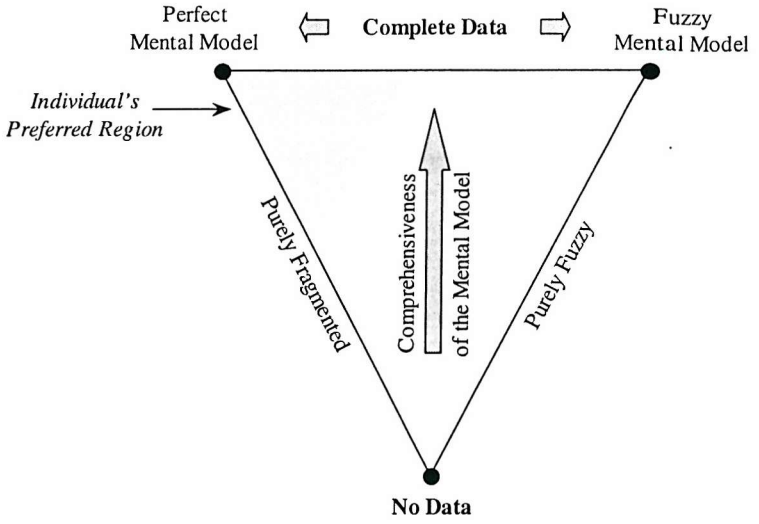

Figure 6.3 – Combination between Fragmentation and Fuzziness

One may, indeed, argue for a *paradigm* that people have a natural inclination to seek a pragmatic view, or at least to avoid the occurrence of fuzziness in their mental models. However, it should be noted that the occurrence of fuzziness is resulting from people trying to reduce fragmentation in their mental models by seeking information in a data-rich but inefficient environment. Therefore, naturally, the key to success resides in people's ability to interpret the data in coherence with their task, and for which people need to eliminate the opaqueness they perceive in data. It should also be noted that 'coherence of information' does not necessarily mean 'information supporting people's personal opinions' because this information could coherently *challenge* a person's opinion in favour of another, which can also be considered as coherence with the task.

Thus, eliminating opaqueness in data can be seen as a vital aspect of information-seeking because, on the one hand, people are trying to restore their mental models, and on the other hand, they are trying to avoid fuzziness.

6.3.2 Elimination and Avoidance of Opaqueness Through 'Contextualising'

As opaqueness being the event of disappearance of links between data and tasks, people confronted opaqueness through a complementary process that established intuitive links between data and tasks. This complementary process however emerged as a *proactive approach* against lengthy trial-and-error sequences that people generally disliked within the *time-constrained environments* of XD and XA. We may see this as a phenomenon that is generic to such environments, and name it 'contextualising'.

Thus, contextualising can be defined as the *proactive act* of *positioning data* within the context of a specific task so that interpretations of that data are *confined by this context,* and the emerged information is *focused efficiently* at the problem concern. Contextualising can also be described as 'trying to see the meaning of data through the purpose', or people trying to find proactively the 'things they want in the data' rather than waiting for the emergence of 'things that data contain'. Thus, contextualising is nothing more than preparing people's minds for the interpretation of data without having to adopt lengthy trial-and-error sequences that people can otherwise use to converge the meanings assigned to data. Hence, we suggest that contextualising is the *missing link* between data acquisition and data interpretation that people require to lead data to the efficient emergence of information.

It should be noticed that contextualising was not significant in laboratory based experimental research that exposed people's cognitive processes mainly because, here the data were usually *presented* with minimum opaqueness (see section 2.2). In contrast, real-life information-seeking may be *characterised by contextualising* that might even evolve into several interactions before people interpret data in the context of the task.

Importantly, however, contextualising was defined above in relation to the *elimination of opaqueness*. But, in this dissertation we suggest a *theoretical extension* to this concept so that it becomes generic to information-seeking, which can therefore be used to describe the avoidance of opaqueness. Based on this theoretical extension, we

suggest that contextualising is a fundamental phenomenon that interrelates with data acquisition to characterise people's information-seeking function.

Noticing that data are signals representing some attribute of objects, systems and phenomena in the real world, or even one's imagination, the decision-maker has a natural urge to know which attributes of which objects, systems, phenomena or the imagination that a particular set of data corresponds to. It is unlikely that any person would want to use data with a purely blind assumption of what it represents. Therefore, contextualising is essentially about seeking a satisfactory answer to the implicit question: 'what do these data represent?'. However, this is only one aspect of contextualising. The other aspect refers to the *purpose* of acquiring the data. Again, it is highly unlikely that any person would want to use the data with a purely blind assumption about its usefulness in the context of their task. Therefore, contextualising is also about finding the answer to a second implicit question: 'how do these data relate to the task?'. Hence, contextualising is the act of *establishing specific links proactively* between the data and task purely for the purpose of obtaining information that is *specific* for the task.

It should be noted that *contextualising* and *interpretation* are two different phenomena relating a set of data, which may not however be identified always as separate acts. The two phenomena are related in such a way that, although emergence of information from a set of data is the result of *interpretation*, this will have been *confined* by the *contextualising* that had taken place previously. It is this *confining effect* of contextualising that *channels the interpretation* of data towards efficient emergence of specific information.

Theoretical Extension to the Concept of Contextualising

Thus, following the above description that contextualising means emphasis on *forming specific intuitive links between data and tasks*, this concept may now be extended beyond its explicit use in eliminating opaqueness into describing how people avoid opaqueness in their information-seeking function. For this, we may suggest the following theoretical statement: *contextualising can occur at all stages of an interaction between people and information sources, but the means of achieving it,*

and hence its explicitness, can vary depending on the particular stage where it occurs. This can be further described, for the time being, with reference to the following simplified framework, which identifies three stages of an interaction where contextualising could occur (Table 6.1). This framework will be re-visited in the next section following the establishment of the important concept: *information-seeking act.*

Table 6.1 – Stages of Contextualising in a Data-Acquiring Interaction

Stage 1 Before the Interaction	People can *assume* intuitive links between their tasks and *expected data* through a process of thinking based on their *pre-knowledge.*	Implicit Avoids Opaqueness
Stage 2 During the Interaction	People can emphasise creating links through *inquiry* from the information source.	Partially Explicit Avoids Opaqueness
Stage 3 After the Interaction	People can emphasise creating links either through: • An extended process of thinking or • Inquiry from another information source	Explicit Eliminates Opaqueness

The above framework can be illustrated using the following example: It was observed that Louise (XD) purposefully used brief interactions to obtain data from sales staff because she was confident that she would receive the data exactly in the way she needed. In this case, links between data and task were clear to Louise even before acquiring the data (she perceived), which implies that contextualising was *implicit* and *preceded* the data acquisition. In contrast, Louise sometimes had to establish links after receiving the data because she did not receive it in the way she needed. In this case, contextualising was *explicit* and *followed* the data acquisition.

Table 6.1 also shows that people do not contextualise data through a process of thinking alone. On this aspect, empirical data suggest the important proposition that people do not always have the capacity to contextualise through thinking alone. It shows that people's pre-knowledge can usually be limited, and they often operate within time-constrained environments, which reduced both their capacity and opportunity to succeed through a process of thinking alone. Thus, empirical data suggests that 'people need help' to progress through their thinking process, and this help comes in the form of further information that may be known as *secondary information.*

6.3.3 Importance of Secondary Information and Expansions in People's Information Need

It was observed that Louise sometimes received data from her sales staff, which she could not interpret in the context of her problem even though she carried some knowledge about both the problem and what the data represented. In such occasions, Louise preferred discussing with her 'favourites' in the sales staff, and the aim of these discussions was not to obtain more data but to clarify already received data in the context of the problem. In other words, her aim was to contextualise the data that she had already received. For this, Louise had to change her focus from primary task into obtaining some specific information that did not have *direct relevance* in the context of her task, but still important for *facilitating the emergence* of relevant information from the data. This supplementary information may be known as *secondary information.*

It may be suggested that Louise had two options in the above situation: she could have either spent time thinking over the data or seek supplementary information, and Louise adopted the latter option. There were two main reasons for this behaviour. Firstly, Louise often did not have sufficient pre-knowledge to contextualise through a process of thinking alone, and this limitation brought in the need for further information. Secondly, Louise was often discouraged to think because of time constraints, where she once stated 'I would not waste time going up and down the same data...'. Therefore, Louise sought secondary information because it was the more confident path to follow under those circumstances.

It was interesting to observe that time-constraints often drove people to seek secondary information irrespective of the fact that they had sufficient pre-knowledge to contextualise through a process of thinking. Andrew (XD), for example, often avoided thinking, and instead sought secondary information, which can be ascribed clearly to his extreme time-consciousness. Andrew however implied he may have had the knowledge to think over the data, but under the circumstances he preferred to speed up the process by 'borrowing the thinking' from the others.

Extension to the Concept of Secondary Information

It is important to highlight that the concept of secondary information can be extended beyond the explicitly distinguishable interactions of people. For example, the difference between Louise's and Andrew's behaviour was that, while Louise adopted *additional interactions* with her favourite staff, Andrew used only a *single interaction* that gave him data as well as the 'thinking'. We may therefore ascribe the concept of secondary information to the *exploratory aspect* of people's *information search,* irrespective of whether the data was *searched through exploration* as Andrew did, or the *exploration followed* the data acquisition as Louise did. This theoretical perspective suggests that secondary information may be acquired over the same physical interaction that gives people the data. This aspect was referred to in Table 6.1 where it was suggested that people can contextualise through *inquiry* over the data acquisition. It therefore implies that any interaction between people and information sources can involve secondary information if people emphasise *clarification of data* that does not directly appeal to their intuitive mind.

We may, therefore, suggest the hypothetical situation where the data make complete sense to people; hence there is no need for secondary information. In reality however the data will tend to carry opaqueness, at least to some degree, which calls for secondary information, and this might or might not induce further interactions between people and information sources depending on whether people can *speculate* it and resolve over the data acquisition. Thus, we may suggest that secondary information need has caused a *natural expansion in people's information need* as people progressed through their information-seeking function. In an idealised environment, people will always receive data that make complete sense to them, and therefore the information need will not evolve beyond what has arisen from their tasks. However, as it was shown previously that opaqueness is the result of personal and organisational inefficiencies, expansions in information need can be suggested as a phenomenon that is generic to the natural organisation where both people and the environment always carry inefficiencies.

It may also be suggested that expansions in information need is the result of time-constrained environments that people experience in their decision-making tasks. As it was suggested originally, contextualising is the result of time-constraints, otherwise people would follow trial-and-error sequences that might not require that much of secondary information (Figure 6.4).

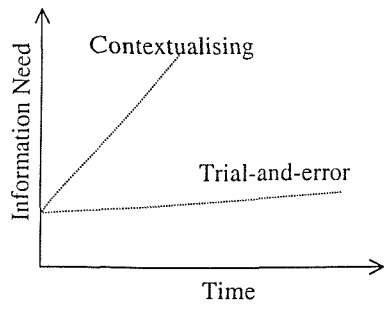

Figure 6.4 – Contextualising Vs Trial-and-Error

Information Seeking Acts

However, people naturally incorporated the expansions in information need within their information-seeking efforts. For example, Louise sought secondary information after failing to understand the data from sales staff, which, from Louise's perspective, was part of the same event of information-seeking. Therefore, Louise's interactions that produced information can be described as forming an *information-seeking act*. Characteristics of these acts are such that they consist of *one data acquisition* and other necessary interactions to produce the 'right kind of information' from that data. It should be noticed that Louise's information-seeking act originated from her emphasis on a single interaction to acquire data, which she believed would give her the information. But, failing to achieve this, her act *evolved* subsequently into further interactions until she received a pragmatic view out of that data. Therefore, we may generalise that an act of information-seeking would evolve from people's *initial emphasis* into *many interactions* with many information sources that ultimately offer them the appropriate information.

Thus, all interactions within a person's interaction-space can be grouped into many acts of information-seeking, and these acts form an essential context for its interactions. We may, therefore, suggest that people plan each of their interactions in a context created by the evolution of some information-seeking act. This context together with people's beliefs about their tasks and environment can form a vision of *how to further their acts*, and accordingly, people would select not only the information source, but also a kind of interaction with that source, which they believe would offer them the information. For example, in the case of Louise, she planned

her first interaction in the belief that there is no need for exploring the data, in which case her initial vision was for an act of single interaction. This created a context for her second interaction, which she planned by knowing (1) there is a need for exploring the data, (2) there is support available and (3) time is constrained upon the task. Alternatively, Louise may have planned her first interaction with the intention of having a second interaction to contextualise, in which case her initial vision would have been for an act of two interactions. Figure 6.5 shows this evolutionary process that leads a set of data into 'right kind of information'.

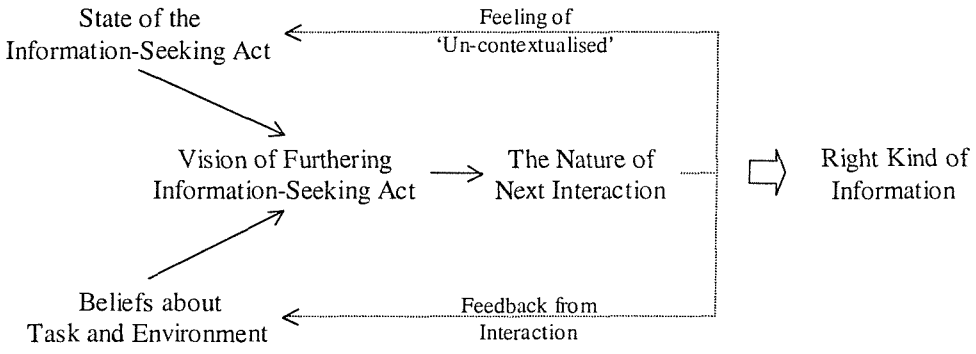

Figure 6.5 – Evolution of Information-Seeking Acts

Thus, empirical data suggest that information-seeking in the organisational environment is not synonymous with data acquisition, but involves an essential auxiliary phenomenon of contextualising, which can therefore be generalised as a 'two-tier process'. Hence, an objective inquiry of people's interactions with information sources would provide only the *scattered elements* of these two-tier processes. They have to be integrated in the context of the two-tier process to create information-seeking acts, which would then provide the true nature of information-seeking in these organisations.

We may, therefore, suggest that identifications of secondary information need and the evolution of information-seeking acts are vital aspects of understanding the nature of information-seeking function within any contextual setting. The next section aims to obtain further insights into these acts of information-seeking, and from that it aims to provide an insight into the nature of people's interactions with information sources.

6.4 The Nature of People's Information-Seeking Interactions and its Contextual Aspects

The aim of this section is to describe the nature of people's information-seeking interactions in the context of the generic two-tier process suggested in the previous section, and to investigate its contextual dependence.

This section begins with a description of how people have arranged contextualising within their information-seeking acts, which defines the nature of these acts. It will then go on to describe how this arrangement depends on the context and how it is reflected in people's interaction with information sources. This will then lead into a theoretical framework that describes the contextual aspects of the nature of people's information-seeking interactions.

The next section (6.5) will provide an overview of the theoretical perspectives emerged through this chapter.

6.4.1 Arrangement of Contextualising in People's Information-Seeking Acts

The previous section (6.3) suggested a theoretical extension to the concept of contextualising so that it encompasses an entire information-seeking interaction. However, it was also suggested subsequently that information-seeking in organisations is better described through *information-seeking acts* rather than through individual interactions. We may therefore investigate the concept of contextualising in relation to these information-seeking acts.

In its one extreme, an act of information-seeking will consist of only a single interaction with a source of information. For example, Louise acquired data from sales personnel, on which she often did not require any follow-up clarification. In such cases, a person will have achieved contextualising within this single interaction, and according to the framework in Table 6.1, contextualising may have occurred before and during the interaction. However, an act was generalised as having more than one interaction where data acquisition was only one element of this act, and

consequently contextualising was seen to have extended beyond this initial interaction of data acquisition. Thus, the framework in Table 6.1 is re-visited below in Table 6.2, but now with reference to information-seeking acts, where it decomposes an act into three phases in relation to this *key element of data acquisition*. Importantly, in this framework we consider contextualising as an on *going process* that occupies all stages of an act, which takes into account the fact that acts are evolved because people fail to contextualise.

Table 6.2 – Stages of Contextualising within Information-Seeking Acts

Phase 1	Immediately before data acquisition	A person begins data acquisition with expected data being contextualised *to some degree* by pre-knowledge. Person's confidence in this default contextualising depends on his/her confidence over the validity of the pre-knowledge.
Phase 2	During data acquisition	The person may either continue to complete the above default contextualising through inquiry, or unfreeze the default contextualising and re-contextualise it through inquiry during data acquisition.
Phase 3	After data acquisition	The person may continue contextualising through either reflection over an elongated period of time or seeking further interaction with the same or other sources of information.

This framework suggests that data acquisition begins with people's pre-knowledge serving as the initial basis for contextualising. People usually carried some knowledge about their task in hand and some prediction about the data they expected to receive. Therefore, people had some intuitive links formed between the data and task at the outset of their data acquisition. However, people did not always close their perceptions on this pre-contextualising, which depended on their experience and also on speculation about possible change in circumstances. As a result, people carried contextualising into Phase 2 where they made inquiry, or in other words, they sought secondary information from the data source itself.

Contextualising was even continued into Phase 3, which followed data acquisition. People either continued the thinking process by reflecting on information they already received, or emphasised further interaction to seek more secondary information.

Importantly, however, the above process was not arbitrary, but it was configured through people's conscious interference. And, the instrument that people used for this configuring was the *nature of their interaction*. Thus, people consciously decided an optimal arrangement between data acquisition and contextualising based on their beliefs about the nature of their task and the environmental context (information systems and time-constraints) where information was sought, and implemented it through selecting a sequence of interactions of an appropriate nature. For example, if a person believes that he/she does not need to proceed beyond above Phase 1, then he/she would decide a single interaction to acquire just the data. Alternatively, if this person believes that the data source is inefficient to contextualise, then he/she will have planned for further interaction following data acquisition.

It can be suggested, therefore, that the nature of interaction is best characterised through its expected contribution in terms of data and secondary information. As suggested in the previous section (6.3) that the exploratory nature of interactions is associated with secondary information search, a person emphasising on Phase 1 alone will adopt least exploratory interaction, and a person emphasising on Phase 2 alone will adopt the most exploratory interaction.

We, therefore, suggest that people create visions of their potential acts of information-seeking, and implement these through adopting interactions of an optimal nature that would provide them expected data and secondary information. People might however alter their vision contingently as interactions unfold, which might result in either a change in the nature in which they interact or emphasis on further interactions.

It was shown previously that Andrew's (XD) emphasis was usually to 'borrow the thinking', which is a typical example of a person's initial vision containing the need for both data and secondary information. Andrew implemented this vision through a single interaction mainly because of his time-consciousness, which he could have otherwise implemented through two interactions: data acquisition followed by a

thinking process, and then seek secondary information if required. Therefore, clearly it is Andrew's speculation of possible occurrence of opaqueness within his environmental context that influenced him *not to think* but 'borrow the thinking'.

We firstly suggest the following framework (Table 6.3) to describe the nature of interactions between people and information systems, in which we define three extreme categories of interactions based on their degrees of focus on both data and secondary information.

Table 6.3 – Extreme Characteristics of Information-Seeking Interactions

Shallow Interactions	**Exploratory Interactions**	
	Soft	**Complex**
The focus is on acquiring *data*	The focus is on acquiring *secondary information*	The focus is on acquiring both *data and secondary information*
People *will have* contextualised the data prior to data acquisition, and it is *not re-contextualised* over that interaction	People seek secondary information in order to contextualise some data that they have acquired through previous interaction.	People *may or may not have* pre-contextualised the data, but it is re-contextualised *completely* over the interaction.
Reliability of the source is important.	Importance of reliability may diminish over the interaction.	Importance of reliability may diminish over the interaction.
Generally brief in nature.	Generally detailed in nature.	Generally detailed in nature.

Secondly, the three following subsections provide detailed descriptions of above categories of interaction, highlighting the factors that influence their occurrences. These factors will then be integrated to suggest a framework that shows the contextual dependence of information-seeking interactions.

6.4.2 Shallow Interactions

People generally emphasised shallow interactions when they depended heavily and confidently on their pre-knowledge as the basis for contextualising. In these circumstances, people achieved contextualising implicitly by forming intuitive links between data and task at the *outset of data acquisition*. People did not see the need to carry the contextualising into Phases 2 and 3.

For example, Louise adopted shallow interactions with her sales staff whenever she perceived that the data they send would explicitly relate to her problem. On many occasions, Louise was motivated only to collect the data they sent to her via electronic mail. She explicitly rejected the need for detailed interactions like using the telephone because she confidently speculated that data will not become opaque. Hence, Louise was satisfied with receiving *just the data*. A similar behaviour was observed from Rod in the European strategy project where he emphasised shallow interactions with the CTD because he assumed that both the transatlantic market and CTD was reasonably transparent to him.

It can be seen that both Louise and Rod adopted shallow interactions when their problems were associated with 'commonly associated' systems. Their information needs were explicit enough to the extent of raising straightforward questions where it was seen that at one stage both these individuals departed from shallow interactions because their problems became less clear. Therefore, shallow interactions can be related to high levels of continuity in the task environment.

Apart from the clarity of task, Louise and Rod also had experience with the kind of data that they expected from respective sources. And, equally important was that they placed a high level of trust in sources from which they acquired these data. These can be related to the fact that data channels had been well established in their own environments over a reasonable period of time. However, there was a clear difference in the way that trust was built-up within XD and XA, which showed influence on shallow interactions. At XA, the trust was mostly attributed through bureaucratic routines, and therefore people acted on their familiarity with the data without much concern about who provided it. But, people at XD showed reluctance, and often

sought clarification because the credibility of sources had been assigned by people more than by routines. For example, XD's online information database suffered from this problem, except in the case of scientific data that was compiled by widely-known credible personnel.

Hence, the clarity of the task, experience with data and trust in source helped these people to form intuitive links at the outset of their data acquisition, which led them into shallow interactions. These factors were neither created purely by people nor imposed purely by their immediate and macro environments. Instead, they were created by the interaction amongst people and their immediate and macro environments. Even though the clarity of task can be related to the nature of the business and business environment, it was often re-interpreted through people's experience.

It should be noted that people did not emphasise the exploratory aspects of information channels when they adopted shallow interactions. Instead, people emphasised the aspect of obtaining a straightforward answer to a straightforward question. For example, electronic mail provided an adequate medium for shallow interactions, and its effectiveness diminished with speculation about the emergence of opaqueness. In contrast, the standardised data outputs carried only limited value in this context because interactions in real-life were not shallow to the extreme that could be supported by such rigid presentations of data, except in the case of utterly routine tasks. A typical example was XD's brand book that provided market data in pre-determined formats, which showed only limited usage. However, the brand book was a useful source of information to people like Michael who had the technical knowledge to exploit its flexibility to suite their *expected level of shallowness* in interactions.

6.4.3 Complex Exploratory Interactions

Interactions became complex explorations when a high degree of contextualising was merged into the acquisition of data. These were observed to have occurred due to two main reasons: (1) people's speculation about possible opaqueness in expected data and the lack of confidence in their own pre-knowledge as a basis for contextualising forced them to seek secondary information as a means of contextualising, and (2) people's reluctance to use multiple interactions in seeking information, which stimulated them to seek secondary information over the data acquisition.

Thus, complex explorations carry the implicit objective of avoiding the opaqueness in data through speculating its possible occurrence. An important characteristic of this kind of interaction is its default selection of the *data source itself* as the source of secondary information.

Firstly, factors that influenced people's speculation about possible opaqueness in data were contrary to what stimulated shallow interactions. Thus, people speculated opaqueness because:

- People's information needs were not explicit. This usually occurred either when tasks contained a high degree of novelty or when continuity in tasks was relatively unpredictable. For example, although Louise generally preferred shallow interactions with the sales staff, she sometimes departed from it, which she ascribed to 'loosing track' with what is going on. Similarly, Simon in his work for the promotional campaign identified the novelty involved in the task before acquiring data, hence emphasised face-to-face interactions with the sales staff.

- People perceived a lack of experience with data. This can be ascribed mainly to the inadequate establishment of the particular data channel in people's own environment. A typical example was the problem experienced by some people at XA with regard to the LYNX output, which was meaningless to most who did not have enough experience with it. Even those circulated documents such

as the macro economic review (XA) and weekly reports (XD) proved inadequately established as data sources, despite they had been around for a reasonably long period.

- People perceived lack of trust with data sources. This can also be ascribed mainly to the inadequate establishment of data sources in one's environment. However, as described in previous subsection, trust in these organisations was partly attributed by bureaucratic routines, where people at XA trusted a source without much inquiry while those at XD sought clarification.

Secondly, people's reluctance to use multiple interactions in seeking information can be ascribed to two main reasons:

- People's *time-consciousness* arising from perceived time-constraints was observed to have had the greatest influence on shortening their information-seeking acts. On the one hand, people implied a 'fear of postponing the thinking' where they perceived that they would not have sufficient time to contextualise through a *process of thinking* alone. As a result, they emphasised 'sorting out things straightaway', and followed strategies such as 'borrowing the thinking'. On the other hand, people implied a 'fear of postponing interactions' because they perceived that they would not have sufficient time to repeat interactions in case they needed secondary information. For example, time-consciousness was a main reason for Andrew (XD) to conduct telephone conferences with his sales staff through which he sought exploratory interactions.

- People perceiving that interactions with particular sources are *not easily repeatable* due to organisational reasons was also observed to have influenced their reluctance to postpone interactions. It was observed that repeatability of interactions was partly created by people, although the macro context of the organisation can impose great influence. This was observed with regards to both technology based systems and people based systems. For example, XD's informal culture and team-layout supported repeatability much more than at

XA, but people still showed reluctance, which can be ascribed to their personalities. However, people at XD enjoyed the opportunity of obtaining secondary information incrementally following the development of their understanding of the problem, but people at XA usually made preparations in advance, prior to interactions, even though sometimes they did not have a clear understanding of the problem.

The impact of obstructions to repeatability was enhanced when people perceived that a particular source was *unique* in terms of the knowledge represented. With regards to the data provided by such sources, people sometimes perceived they would not be able to obtain secondary information from any other alternative source. And, as a result, people either tried to achieve contextualising over the data acquisition, or they sought alternative means of obtaining the data that is more flexible in terms of interaction. For example, the failure of the QSI software followed this phenomenon. Here it was seen that people sought alternative means and rejected the QSI because the data provided by the QSI software could not be contextualised through any other convenient means, and neither did the software carry any facilities for providing secondary information.

It was seen that complex explorations have clearly incurred higher expectations on channels of information compared to that of soft explorations. This has often led people to allocate greater emphasis on selecting sources whenever there were alternatives available. However, it should be noted that the need for complex explorations may not always be pre-determined. The reason is that one's pre-knowledge might not be perceived as invalid until he/she has progressed into the interaction. On such occasions people failed to contextualise. Alternatively, people managed to select a 'satisficing' option if they perceive the need at the outset of data acquisition. For example, Simon (XD) working for the promotional campaign rejected using the telephone and electronic mail in favour of face-to-face meeting with the sales staff because he perceived the need for exploratory interactions from the outset.

In conclusion, people's preference for complex explorations can be ascribed to their speculations about possible opaqueness in the data and reluctance to use multiple interactions. Again, these factors were created through interaction between people and their immediate and macro environments. However, it should be noted that despite people's preference, they were not always successful in achieving complex explorations. This can be attributed to the limitations in search-supply mechanisms operating in their environments.

6.4.4 Soft Exploratory Interactions

Interactions can be described as soft explorations when they are for the purpose of obtaining secondary information to contextualise some data that had been already acquired. In this case, contextualising becomes an explicit event, which contrasts with both previous categories of interaction. However, the occurrence of soft explorations may not always be the preference of people because it involves multiple interactions in an act of information-seeking.

People might prefer to split data acquisition and contextualising in situations where data sources appear inflexible and user-unfriendly but alternatives are available for secondary information. This was particularly noticeable at XD because its informal culture offered opportunities for clarification. For example, Tony often suffered from inflexibility inherent in the brand book because he did not carry enough technical knowledge to manipulate these data. But, he often received help from his colleagues to put these data into context. Thus, Tony's preference to split data acquisition and contextualising can be ascribed to the availability of secondary information in his environment. It can be seen that this availability of secondary information was subjectively created by Tony, and not imposed purely by the macro context. It depended on both Tony's communication skills and the culture that surrounded him in the organisation.

The need for soft explorations often followed the interactions of the previous two categories. Thus, despite people's preferences, both shallow and complex exploratory interactions often resulted in data being inadequately contextualised. And, people

naturally required further interaction to achieve contextualising, which were focused mainly on acquiring secondary information. Failures of shallow interactions can be ascribed mainly to unforeseen aspects of people's tasks and overconfidence about data and sources. Failures of complex explorations can be ascribed mainly to people's inadequate knowledge about the nature of information systems in their environment. Hence, it may be stated that, despite people's preference for a particular type of interaction, the two-tier process was often explicit to at least some degree in these organisations.

Furthermore, even if *purposeful data acquisitions* were discrete events, data supply can be seen as continuous in organisational data-rich environments. Hence, searching for secondary information can also be seen as a continuing event that 'fluxes' people's organisational lives.

6.4.5 Contextual Dependence

So far this section has suggested that the arrangement of contextualising within people's information-seeking acts would reflect in the nature of their interactions with information sources. It has argued that an interaction could fall into one of three broad categories depending on the stage where contextualising occurs within the information-seeking act. It has also shown that this arrangement was not determined by organisational factors alone, but through interaction between people's personal qualities and organisational factors. However, the impact of personality aspect was seen to have depended on the opportunities offered by organisational factors for people to exploit their personalities. Organisations XD and XA can be contrasted in this aspect where the emerging culture at XD has given more opportunity for people to differentiate themselves than by the seemingly bureaucratic culture at XA.

Figure 6.6 shows how these organisational factors can be related through people's interpretations into their information-seeking interactions. It suggests that the nature of interactions is derived purely from an interpreted context, which is people's interpretation of organisation's reality.

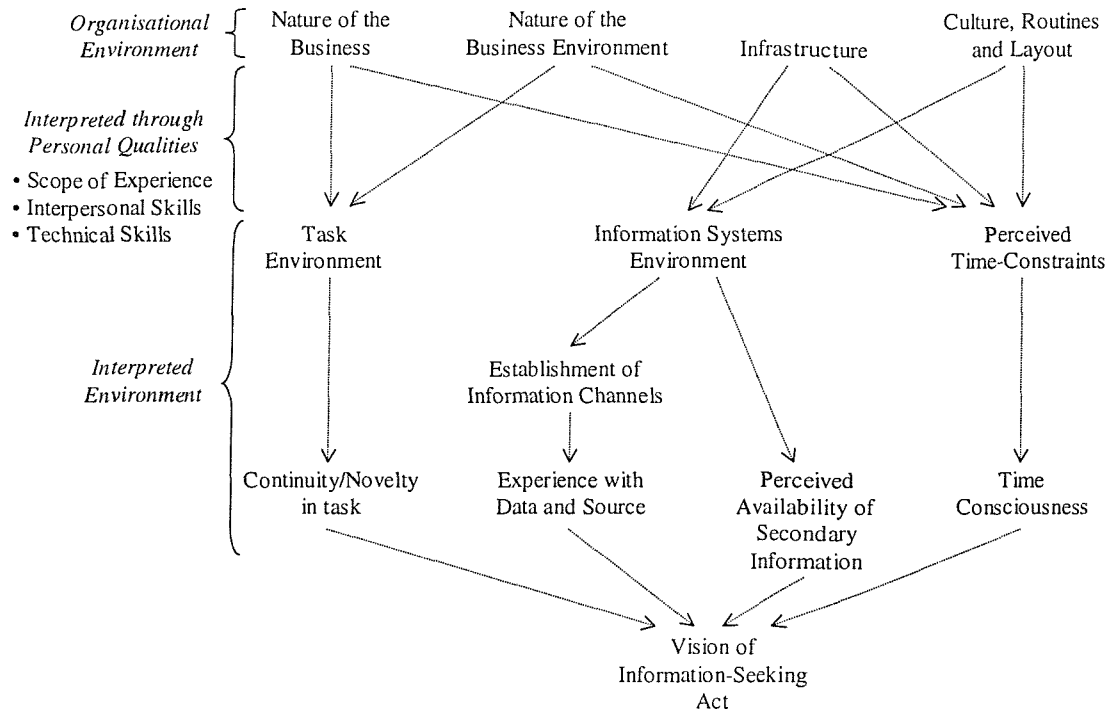

Figure 6.6 – Contextual Aspects of Information-Seeking Interactions

We suggest that people interpret their organisational environment in the light of their personal qualities, which therefore leads to a uniquely created environment for seeking information. These personal qualities mainly consist of communication skills, technical skills and general experience of being a decision-maker, through which they evaluate their tasks, scope of information channels and the severity of time-constraints. However, it should be noticed that the uniqueness of this created environment would be diluted when organisational factors overpower personal factors. For example, XA's communication culture overpowered people's communication skills to a large degree, and therefore people having good communication skills did not create much uniqueness in their own environments. However, people had more opportunity to differentiate themselves through technical skills.

It should be noticed that people's information systems environment was created by relatively stable factors such as infrastructure, culture, routines etc, and its scope depended on the state of these factors. However, this stability might be disadvantageous to people in a context where the scope is limited because changing the scope is generally beyond the capacity of people, and even for the information

systems function. XA is a typical example of this where people felt powerless in the midst of bureaucratic routines.

In Figure 6.6, the organisational environment, which is defined by organisational factors, is not necessarily the 'organisation in large'. It can be subunits or teams; whichever has the direct influence on the decision-maker regarding particular tasks. For example, a business unit can have its own environment that influences its members in some of their tasks, but it may be the broader organisational environment that influences the other tasks. Or, it may be the case that people are influenced by both these environments. Therefore, it is inappropriate to assume that people are confined by one of these contexts only. However, one may indeed argue that broader organisational environment has influence on all of its subunits and teams, which carries truth to some degree. But, it may also be argued that it is the nature of the broader organisational environment that either enhances or diminishes the uniqueness in its subunits and teams. For example, it was observed that the broader context at XD has allowed leadership to manifest within its subunits, which has therefore allowed the formation of different cultures. This was not so significant within XA. Thus, the behaviour of a person at XD should be studied in relation to subunits more than that of a person at XA. Hence, the organisational environment shown in Figure 6.6 has to be chosen appropriately to suit the task.

6.5 Summary of Conclusions

a) Expanding Information Needs

This analysis suggested that people's information-seeking in organisations is characterised by the interplay between two specific phenomena named 'opaqueness' and 'contextualising' (Figure 6.7).

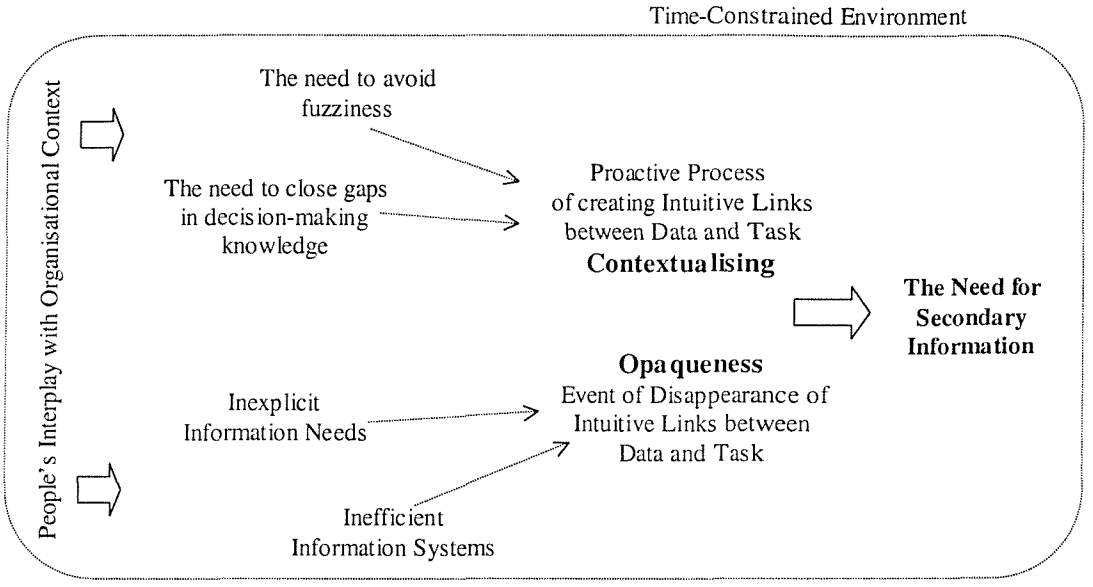

Figure 6.7 – Interplay between Contextualising and Opaqueness

We defined 'opaqueness' in section 6.2 as the event of disappearance of links between data and task within people's minds. It represents *the reality* in which people are *organisational beings*, who live within the constraints of its environment, and therefore subjected to the receipt of *un-customised data* that they see as *opaque* in the context of their task. This research sees opaqueness occurring because of, firstly, people's inexplicit information needs, and secondly, inefficiencies in information systems they use.

We defined 'contextualising' in section 6.3 as referring to the *proactive approach* that people adopted against lengthy trial-and-error sequences to create *intuitive links between data and tasks*. Contextualising *confines* people's interpretation of data to focus efficiently at their tasks, which is therefore the *process of preparing data* for

efficient interpretation. We see contextualising as *generic to information-seeking* because, firstly, people have a natural need to link data with tasks, and secondly people have the urge to avoid trial-and-error in time-constrained environments.

We therefore suggest that contextualising is the link between data acquisition and data interpretation, which is a phenomenon that resides within people's information-seeking activities *at all times*. But, it enters people's *consciousness* only following either a speculation about opaqueness or an actual experience of opaqueness.

This perspective therefore suggests that speculations and experience of opaqueness can *change people's focus* temporarily from their main tasks of decision-making into *auxiliary tasks* of avoiding and eliminating opaqueness. However, because there are limitations in people's ability to confront opaqueness through intuitive thinking alone, this theory suggests that there is natural expansion in people's information need, which requires people to create further interaction with information sources. This additional information may be known as *secondary information* because it takes the auxiliary role of enabling the emergence of primary information from the data. This theory therefore suggests that people's interactions we observe objectively are not a true representation of information needs arisen from their tasks, but an evolution of this primary information need through personal and organisational inefficiencies.

b) Information-Seeking Acts

Based on the above perspective of expanding information needs, section 6.3 suggested one *should not* view those many interactions between people and information sources as independent cases of information-seeking, despite each interaction being driven by some sort of an information need. Instead, it suggested one should view those interactions as *groups* that coherently serve the emergence of 'particular bits of information', where each group consist of *only one data acquisition* but many possible acquisitions of secondary information. Such groups of interaction may be known as *information-seeking acts*, and this analysis suggests that people's interaction-set consists of many such acts containing varying numbers of interactions as shown in Figure 6.8.

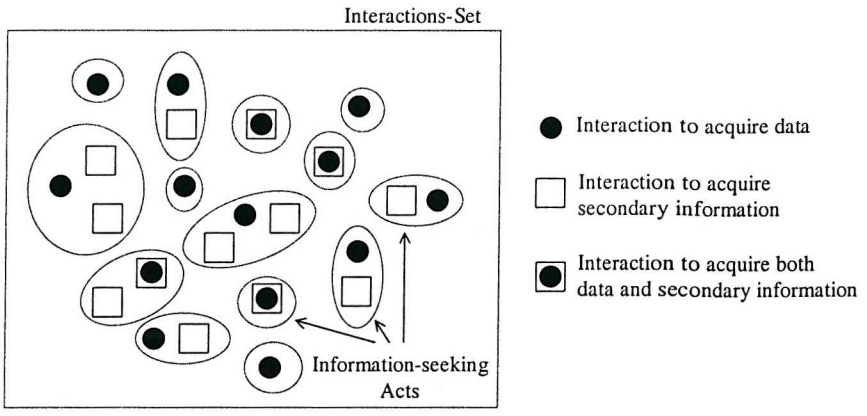

Figure 6.8 – Information-Seeking Acts and Interactions

The above perspective of information-seeking acts brought in the important questions: (1) how are these acts initiated, (2) how do they evolve? Section 6.4 showed that acts are initiated and evolved through people's conscious interference. It suggested that people acquire data with a *strategy for contextualising*, where this strategy is drawn from their beliefs about tasks, data and the environment. Fundamental forms of this strategy can be illustrated using Figure 6.9.

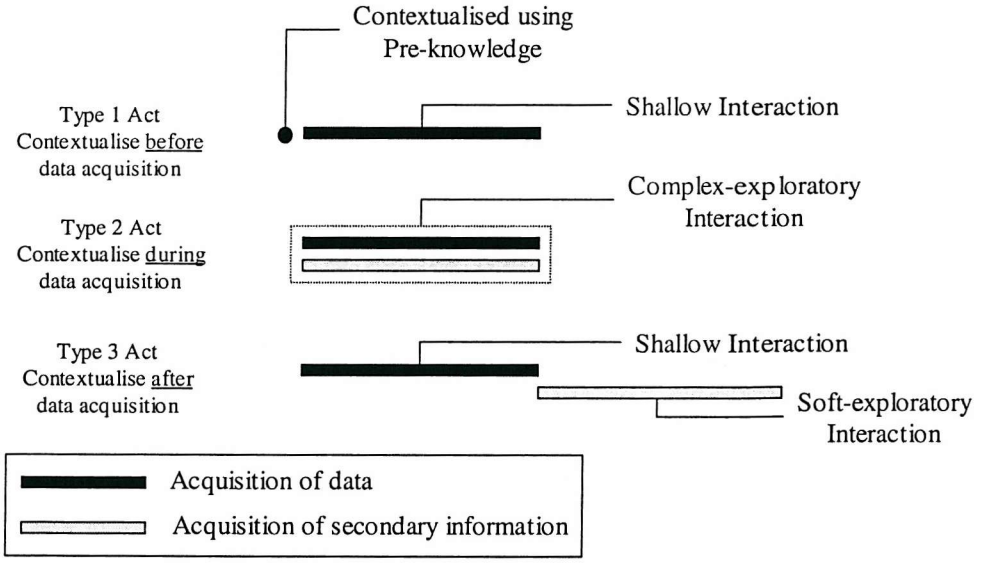

Figure 6.9 – Fundamental Arrangements between Data Acquisition and Contextualising

This figure suggests three possible ways of how an act of information-seeking can be initiated. In Type 1 act, people believe they have contextualised even before the data acquisition, which leads to emphasising *shallow interaction* to acquire just the data.

In Type 2 act, people emphasise contextualising to be *concurrent* with data acquisition, which leads to emphasising *complex exploratory interaction* to acquire both data and secondary information. In Type 3 act, people emphasise contextualising can follow data acquisition, which leads to emphasising shallow interaction to acquire data, followed by *soft exploratory interaction* to acquire secondary information.

Section 6.4 further suggested that people's above strategy is drawn from their beliefs about tasks, data and the environment. It suggests the following framework to describe how these beliefs lead people into each strategic option (Table 6.4).

Table 6.4 – Factors leading to Extreme Forms of Information-Seeking Acts

Beliefs about Task	Beliefs about Data and the Environment	Nature of Information-Seeking Act
High degree of *continuity* from previous tasks.	• Well established information channels • Experience with data	Shallow interaction
High degree of *continuity* from previous tasks or high degree of *novelty* due to changing circumstances	• Emergent information channels • Difficulties of repeating interactions (time and space problems, social reasons) • Unavailability of alternative channels for secondary information	Complex-exploratory interaction
High degree of *novelty* from changing circumstances	• Inflexible or user-unfriendly information channels • Alternative channels available for secondary information	Shallow interaction followed by Soft-exploratory interaction

This led us suggest that people decide their interactions with information sources in the context of this broader phenomenon known as the information-seeking act. Hence, we may suggest that people select information sources with a view of *what to contribute* to information-seeking act, and therefore it associates a concurrent decision of a *nature for interaction*.

Section 6.3 further showed that people initiate their acts through beliefs about their tasks, data and the environment, which define the nature of their initial interaction. These beliefs might not be error-free for producing 'perfect interactions', which people come to know only when interactions unfold. Not only that, circumstances might change autonomously, and these can introduce errors into people's beliefs. These changes in beliefs can cause information-seeking acts to evolve until people contextualise the data pragmatically. Figure 6.10 below shows an example of how an act of information-seeking can evolve beyond its initial plan due to people's changing beliefs. Notice how the nature of interaction has changed in the process.

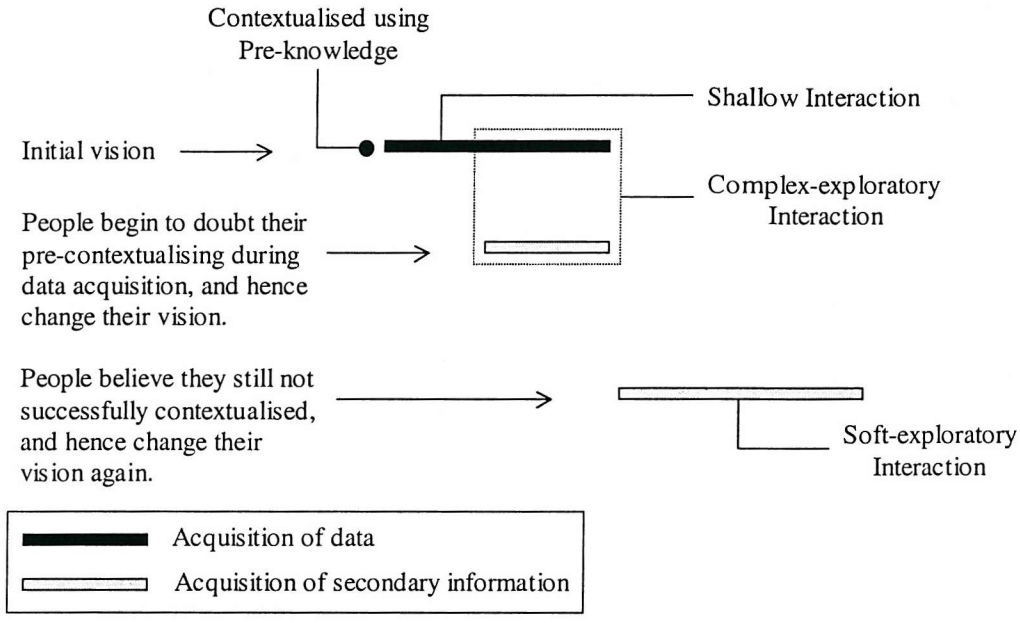

Figure 6.10 – An Example of Evolution of Information-Seeking Acts

This example shows that a person who initially planned to adopt just a shallow interaction might change beliefs as interaction unfolds, and therefore might change emphasis to continue the interaction with more exploration. It also shows that he/she feels 'un-contextualised' even after exploration, which might then lead to further interaction. This example however did not take into account the fact that data need might change during the same process. Interactions might inform errors in people's beliefs about tasks, which might alter their data needs, and this will *create completely new* acts of information-seeking.

We may conclude this summary by stating that information-seeking in organisations involves more than data acquisition and data interpretation. These are linked by an

intermediate auxiliary process that *prepares the mind for data interpretation*, which we called contextualising. We suggest that people's behaviour in seeking information is determined importantly by their assumptions, speculations and approach towards this auxiliary process of contextualising.

The Next Chapter

The next chapter concludes this dissertation with a discussion of perspectives developed in this chapter in the context of existing research literature to highlight the contribution it made to theory and practice of information systems. In addition, this chapter will reflect on the research methodology and highlight issues for further research.

Chapter 7

Discussion and Conclusions

7.0 Introduction

This chapter concludes this dissertation by providing (1) a discussion of the contribution made by this research to both theory and practice of information systems, (2) a reflection on the methodology used in this research (3) a discussion of limitations of suggested theoretical perspectives and a highlighting of issues for consideration in future research. The dissertation can be summarised as following:

Chapter 1 presented the background and objectives of this research. It suggested that organisations are embracing the emerging paradigm of connectivity as a means of exposing people to wider resources of information. As connectivity means creating environments for seeking information efficiently, we suggested organisational information systems have to be analysed through a context-based description of people's generic information-seeking function where the context is defined partly by information systems. Hence, the objective of this research was set for investigating the interrelated phenomena that define the nature of the information-seeking function within organisational environment.

Chapter 2 reviewed relevant research literature to establish a basis for this investigation. This was carried out concurrently with field investigations and analysis, and helped to navigate the study by highlighting areas where contribution was needed. The literature, however, appeared fragmented in the context of research objectives. The main limitation observed with existing theoretical perspectives was their inadequate reference to people as organisational beings who live with limited resources and have complex interactions with the environment.

Chapter 3 described the methodology adopted in this inquiry. The argument for adopting interpretivism as the paradigm for inquiry followed from the explicit assumptions that information needs are subjectively determined, and that the context influences behaviour through people's interpretation, which led to the ontological stance of a socially constructed reality. The preference for Grounded Theory techniques was two-fold. Firstly, the objective of the inquiry was to develop a descriptive theory that captures the complexities of the organisational context. Secondly, field data comprised the scattered experiences of several people, which were not expected to converge to form case studies. This chapter also explained why the researcher deviated from the general approach to Grounded Theory. Furthermore, this chapter described how the field investigation was carried out, and how Grounded Theory techniques were applied.

Chapter 4 presented field data resulting from interviews at the organisation XD to describe the nature of the information-seeking function of people within that setting. It described concepts and phenomena that emerged from Grounded Theory analysis within their appropriate empirical context. In particular, this chapter highlighted how the information-seeking behaviour is significant at individual level, and showed its relationship with the informal culture at XD where people had the opportunity to differentiate themselves on personal qualities. In doing so, it showed the interplay between two phenomena named 'opaqueness' and 'contextualising' within all information-seeking activities, and also showed how it has been affected by the skills and experience of people. It showed the importance of secondary information need that emerged through the interplay, and showed that it is an important aspect of the generic information-seeking function. We related these phenomena to the organisational context of XD.

Chapter 5 presented field data from interviews and observations at the organisation XA. The chapter emphasised the contrast between the macro contexts of XD and XA to describe the nature of people's information-seeking function within that context. It mainly highlighted the limitations in opportunity that people had within XA for exploiting personal qualities due to lack of informality, and showed how it was reflected in their information-seeking function. It showed how the lack of informality

caused friction in secondary information flows, which led people to make assumptions and to leave data resources unexploited.

Chapter 6 developed conceptual frameworks from the concepts and phenomena that emerged from Grounded Theory analysis. From these, we suggested theoretical perspectives on people's generic information-seeking function and its contextual aspects, which provided insights into behaviour observed in the previous two chapters.

This current chapter contains four sections. Section 7.1 discusses the contribution this research has made to theoretical knowledge. Section 7.2 discusses the contribution it has made to the practice of information systems. Section 7.3 highlights how the above contributions can be positioned within existing research literature. Section 7.4 reflects on the methodology used in this project. Section 7.5 discusses the limitations of suggested theoretical perspectives and highlights issues for further research. Finally, section 7.6 provides a brief conclusion highlighting the objectives of this research project and its contribution.

7.1 Contribution to Theory

This section discusses the outcomes of this research project from a theoretical perspective to highlight the contribution it has made to advancements in knowledge. This research has conceptualised people's generic information-seeking function within organisational environments to suggest a theory of information-seeking with reference to people's interactions with information sources and the organisational context. This theory highlights some important phenomena relating to the information-seeking function and their relationships with the organisational context.

Research literature has taken the view that people's information needs emerge from uncertainties and ambiguities in their decision situations, but the motivation to seek information may be differentiated by contextual and personal factors. They have suggested implicitly that people's behaviour in seeking information is characterised by how they select information channels. Some literature offers a prescriptive view that: key to reducing uncertainty and ambiguity is the selection of appropriate media of communication (e.g. Daft and Lengel, 1986; Weick, 1979; Mintzberg et al., 1976). Other research has suggested that people select information channels based on many factors, but mainly accessibility and familiarity, that offer them a pragmatic solution within perceived environmental constraints (Anderson et al., 2001; Von Seggern, 1995; Johnson et al., 1995; Swanson, 1987; Hardy, 1982; O'Reilly, 1982).

It may be stated that literature has mainly *looked out* for a macro view of information-seeking to describe: 'why people seek information?' and 'what sources and media they use, and why?'. These findings have undoubtedly contributed to our understanding of information-seeking and of organisational information systems. However, this macro view of information-seeking has limitations, notably it has provided a macro view of information-seeking behaviour that does not address the complexities of people's interactions with their environment. Consequently, these theories do not lead to in-depth analysis of organisational information systems in the context of seeking information.

In contrast to the literature, this research project inquired into information-seeking in more depth by giving consideration to complex patterns of interaction amongst

people, their environments and information sources. Thus, outcomes of this research will be positioned mainly to suggest new theoretical perspectives, but it will also deepen some existing perspectives. Hence, the contribution to theory from this research is mainly an invitation to *look into* the nature of the information-seeking function to understand it as a dynamic activity containing a sequence of events, and through which we offer a newer perspective at organisational information systems. These theoretical contributions can be described as following:

a) The Theory of the Two-Tier Process and Expanding Information Needs

The central theme that emerged from this research is the view that information-seeking involves more than physical processes of data acquisition and cognitive processes of data interpretation. This research exposed the significance of an intermediate process that *prepares a person's mind for the interpretation of data*, which we called *contextualising*. The observations suggest that the scale of this intermediate process expands as the data becomes 'opaque' in the context of the task and also when time becomes constrained. Opaqueness was seen in data occurring due to inherent inefficiencies in *search-supply mechanisms* that provided task-related primary data to people, which they confronted through contextualising.

A main observation made was people's limited ability to confront opaqueness through *intuitive thinking* alone. It was observed that opaqueness can often be so high in organisational environments, and therefore the scale of contextualising can often *expand beyond people's intuitive capacity* making people wanting *secondary information* to supplement their thinking processes. Hence, it was observed that people's information needs expanding in a *different dimension* to their primary information needs (Figure 7.1). We suggest this phenomenon represents a fundamental aspect of the generic information-seeking function within organisational environments. It was therefore called a *two-tier process* consisting of *primary data search* and *secondary information search*, and the emergence of task-related information is the result of their interplay.

This suggests that people's information needs expand as they progress through a process of seeking information. Hence, people's interactions with information sources that are observed objectively are not a true representation of their primary information need that has arisen from real tasks, but an *evolution* of this primary information need through *personal and organisational inefficiencies.*

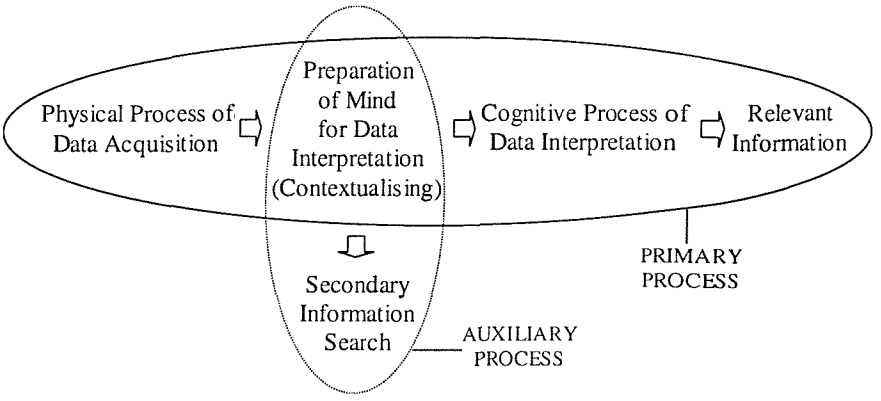

Figure 7.1 – Two-Tier Process of Information-Seeking

It is further suggested that above phenomena are generic to all cases of information-seeking. They existed even in laboratory based experimental research, but not as explicitly as it was observed within natural organisations. That is because in laboratory experiments people were able to 'tackle' opaqueness through intuitive thinking alone. However, some researchers (e.g. Payne et al., 1988; Olshavsky, 1979) did observe the difficulty that people experienced in interpreting data efficiently under changing circumstances, yet this was not identified as an expansion in the information need because people somehow incorporated it within their thinking processes. In contrast, it was observed in this research that the reality of the organisation is different and opaqueness can often grow beyond people's intuitive capacity.

It is important that comparisons are made with research literature at this point. Literature sees that *uncertainty* in decision situations appealing to *objective data* while *ambiguity* in decision situations appealing to *subjective clarification*, which shows some similarity with our views of primary data and secondary information (e.g. Daft and Lengel, 1986; Weick, 1979; Galbraith, 1977; Mintzberg et al., 1976). The literature however takes a *macro* view at broader organisational situations. In

contrast, our research takes a *micro* view at people's information-seeking activities to notice that resolving ambiguity through subjective clarifications is an integral part of reducing uncertainty because data usually comes with some degree of opaqueness in it. It is suggested, therefore, that the former should be considered in the broader context defined by the latter. Hence, findings of this research suggest that even a simple information-seeking activity might involve resolving ambiguity if search-supply mechanisms are not adequately efficient.

b) The Theory of Information-Seeking Acts

Our second important contribution is the proposition that people do not see individual information-seeking interactions as independent cases of information-seeking. Instead, it suggests that people look at individual interactions as contributions made to a broader phenomenon known as the *information-seeking act*, where an act comprises a group of interactions working to produce 'a particular bit of task-related information' by acquiring the data and contextualising (see Figure 7.2). It suggests that people's behaviour in their individual interactions is determined by a *speculative vision* of the acts they serve.

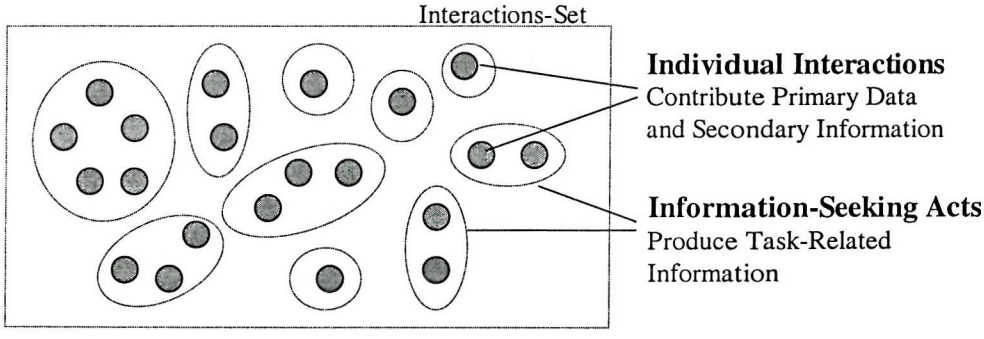

Figure 7.2 – Individual Interactions Vs Information-Seeking Acts

The above proposition is premised in the previous theory of expanding information needs. As stated, search-supply mechanisms are inherently inefficient in organisations, and there is no assurance that people can contextualise data through intuitive thinking alone. In this context, a single information-seeking interaction has

little value in describing people's information-seeking function. Hence, it is suggested that inquiring people's interactions together with the *acts they serve* would give the true nature of their information-seeking function.

Our main concern was how people decide on what to contribute from individual interactions. It was suggested that people do it through a speculative vision of the acts they serve, which they develop based on their beliefs about tasks, data and the environment. For example, a person who is involved in a novel task might access a particular source to obtain just data, which he/she cannot contextualise intuitively. That is because he/she puts this interaction in the context of a broader act where he/she believes there are subsequent means of contextualising this data.

It was observed that people have assigned unwarranted credibility to sources of secondary information just because these sources are *explicitly linked* with the emergence of relevant information. These auxiliary sources mainly provided the contextualising, but people often overlooked the fact that *primary content* of the information has been provided by the data source. It is not uncommon in organisations for people to comment: *'I have my own spreadsheet that gives me all the information'* or *'if I have a problem with some data, I take them to LG, he is a good source of information'*. It can be seen that, on the one hand, the aforementioned spreadsheet or the person named LG did not provide data; they mostly helped the decision-maker to abstract right information from the data that he/she found from elsewhere. But, on the other hand, this data became valuable information only through intervention of those auxiliary sources, and therefore unarguably they are important elements of the information-seeking function. This observation therefore further emphasises the importance of information-seeking acts for understanding the true nature of the information-seeking function.

c) Nature of Interactions and Perspectives on Information Channels Usage

The third aspect of our contribution is the proposition that information channel usage in a particular interaction depends on the degrees of emphasis on primary data and secondary information from that particular interaction. It was observed that the

research literature is dominated by the implicit perspective that information-seeking can be characterised by people's selection of information channels. Importantly, this view carries the implicit assumption that people make optimum selections from a range of options available to them. One stream of literature has emphasised the importance of communication media when selecting information channels (e.g. Daft and Lengel, 1986). The other stream of literature sees that channel selection is mainly governed by the accessibility and familiarity criteria (e.g. Anderson et al., 2001; Von Seggern, 1995; Hardy, 1982; O'Reilly, 1982).

In contrast to the literature, this research suggests that channel selection is a *crude representation* of people's information-seeking function. Our findings take the stance that people in organisations have only limited options in their repertoire of information channels. And, because people have to select repeatedly from these limited options, selecting channels does not indicate how valuable they are as information channels, unless insights are taken into their *usage* at each time they are selected.

A proposition is, therefore, suggested that the *usage of information channels* is related to the *nature of contribution* made by interactions towards information-seeking acts they serve. As interactions can contribute with a combination of primary data and secondary information, this research suggests that people's emphasis on *exploratory aspects of information channels* depends on the anticipated degree of secondary information from those interactions. It can be suggested, therefore, to use the concept: *the nature of interaction* to describe the nature of contribution made by an interaction, which therefore represents the usage of information channels. Hence, we suggest people's selection of information channels includes a *concurrent decision about the nature of interaction* with that information source.

The main contribution here is the framework that is summarised below in Figure 7.3, which shows the bounded space of the nature of interaction. It suggests that people's individual information-seeking interactions occupy a position within this triangle that is bounded by three extreme natures of interaction, which depends on people's degrees of emphasis on primary data and secondary information.

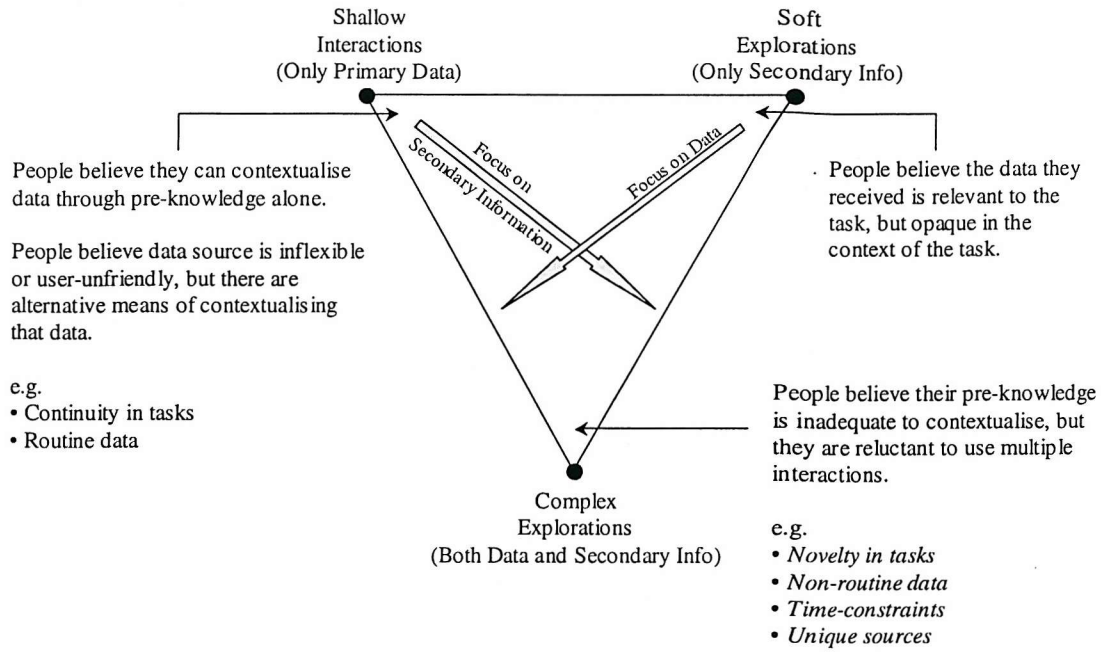

Figure 7.3 – Bounded Space of the Nature of Interaction

d) Towards a Dynamic View of Information-Seeking

Grounded on the concept of information-seeking acts, this research suggests that people's generic information-seeking function is a dynamic process that evolves through selection of both information channels and natures of interaction. In one extreme, this process might reduce to a single event when contextualising is incorporated totally within people's intuitive processes. For example, this is usually the case with laboratory based experimental research. However, as the opaqueness that is inherent in real world mechanisms usually expands beyond people's intuitive capacity, and requires secondary information from external sources, the information-seeking function expands naturally into a sequence of events beyond data acquisition. One main suggestion was that people are trying to optimise their efforts by changing the nature of their interaction with information sources as these sequences of events evolve.

This research therefore suggests that the efficiency of the information-seeking function depends on people's decisions about natures of interaction. These decisions depend on both people's ability to forecast their secondary information need and their

knowledge about how to obtain it. It therefore depends on people's beliefs about their tasks, anticipated data and the environment. However, people's beliefs cannot be error-free for deciding on 'perfect interactions', which causes information-seeking acts to evolve because people change their beliefs, until they reach a pragmatically defined fulfilment. We observed two ways in which people's beliefs evolve:

- Firstly, there are proactive communication systems in organisational environment that constantly inform people about changing circumstances and help them update their beliefs.
- Secondly, people come to know the errors in their beliefs through their information-seeking interactions.

Therefore, in the absence of adequate mechanisms that proactively inform people about organisational realities, people have to initiate their information-seeking acts based on assumptions made through knowledge and experience. Figure 7.4 below shows these mechanisms that cause the evolution of information-seeking acts.

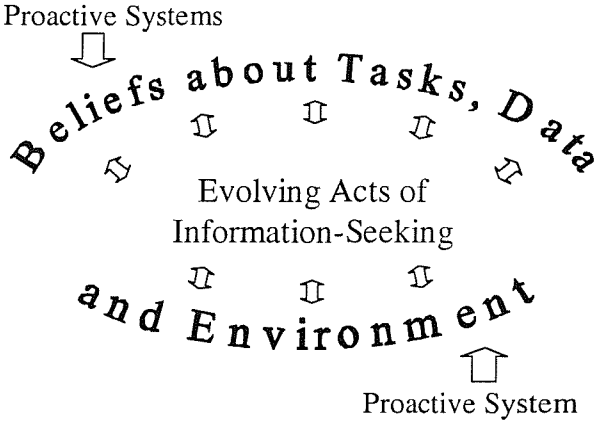

Figure 7.4 – Mechanisms Causing the Evolution of Information-Seeking Acts

We may now ask what is meant by 'improvements' in the context of this generic information-seeking function. On the one hand, a paradigm of given reality may assume where both people and organisations are inherently inefficient. As such, the expansions of information needs are generic, and therefore improvements mean underpinning the generic function of data acquisition and contextualising. On the other hand, we may assume a paradigm where above reality can be changed. In this

case, improvement can mean controlling the evolution of information-seeking acts. These aspects will be further discussed in section 7.2.

e) Context Dependence of Information-Seeking Function

The fifth aspect of our contribution is a theoretical framework to describe the context dependence of people's information-seeking function. It was suggested previously that people's decisions on the natures of interaction depend on their beliefs about organisation's reality, and therefore the organisational context influences these decisions through people's interpretations, which constantly change their beliefs. It may be suggested, therefore, that decisions people make about their interactions are grounded in a context that is created uniquely by people through interpretation of their organisational environment. Figure 7.5 below suggests how the organisational environment relates to people's information-seeking function.

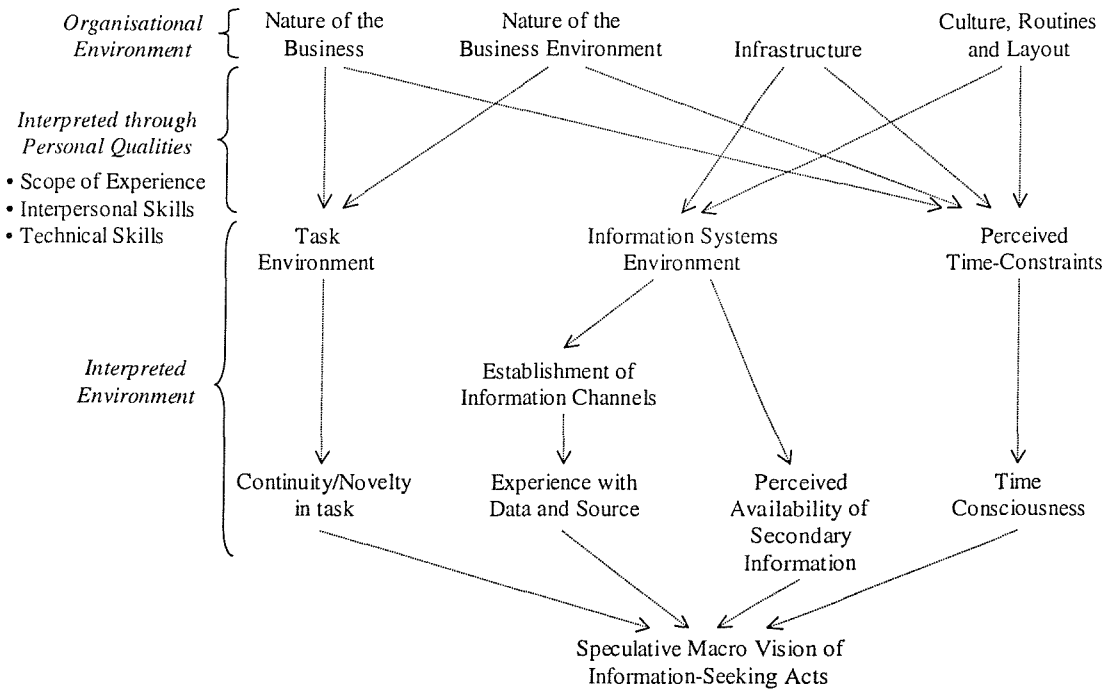

Figure 7.5 – Contextual Aspects of Information-Seeking Function

Figure 7.5 shows that people make decisions within their information-seeking function based on their beliefs about tasks, data & data sources, availability of

secondary information and time-constraints. These beliefs are subjectively created by interpretation of organisational environment through personal judgement. It may be suggested that people interpret the environment through their interpersonal skills, technical skills and general experience of being a decision-maker, and self-evaluate the context within which information is sought. However, the degree of influence from personal element varies according to the nature of organisational factors. As such, personal elements could sometimes be *dwarfed* by organisational factors, in which case the uniqueness in people's interpreted context would dilute. These refer to situations where people receive little opportunity to exploit their experience and capabilities because they operate within environments that are dominated by macro organisational factors.

This research suggests that the organisational context that is influential upon a person may not always be the 'organisation in large'. Instead, it could be a specific department or even a team. However, people's domains of interaction are increasingly becoming dispersed with people working as virtual teams even within the same organisation (e.g. XA). Hence, whether communication is governed by bureaucratic routines or by interpersonal relationships may be an important factor to consider.

It was observed that people's task environment was characterised by higher degree of novelty during periods of rapid change, which diluted people's advantage of having experience. This was again not reflected homogeneously within organisations, and in such case the organisational context was represented by the local context, which may be subunits, including teams. As a result of turbulence in task environment, people often became reluctant to depend on shallow interactions even for their routine tasks, particularly when time was perceived as a constraint.

In contrast to task environment, people's information systems environment showed less turbulence due to organisational context because it was grounded on more stable factors such as infrastructure, culture, routines etc. However, this stability sometimes disadvantaged people when organisational factors overpowered the personal differences by giving people only little opportunity to exploit some of their capabilities. Such rigidity could exist within both soft and hard channels of

communication, and these are mainly rooted in cultures and infrastructure respectively.

This framework therefore suggests that people's information-seeking function can be influenced strongly by the organisational context to the extent that people cannot exploit their experience and capabilities within that context. Beyond that, people resolve their beliefs subjectively by taking into consideration their experience and capabilities.

7.2 Contribution to the Practice of Information Systems

The objectives of this research followed from the perspective that organisations are keen to adopt the emerging paradigm of connectivity to create efficient environments for decision-makers to seek information. One of researcher's inspiring questions was 'how to improve organisations' in this particular aspect, and findings of this research have suggested a newer perspective for evaluating organisational information systems.

Firstly, this section suggests a perspective drawn from this research that can be used in practice to analyse organisational information-seeking environment. Secondly, it suggests a meaning for 'improvements' to information systems. Finally, it highlights the existence of 'information bartering' in organisations that people use as a means of overcoming rigidities in their information systems environment.

7.2.1 The Theory of Dual-Mechanisms

The findings of this research suggested a theoretical perspective of people's generic information-seeking function in organisations. This might form a basis for the evaluation of the state of organisational information systems, and their improvements. This theoretical perspective sees that information-seeking function in organisations is a *two-tier process* of data acquisition and contextualising, and people's information needs expand in the process of seeking information because of personal and organisational inefficiencies. It is important to recall the observation that these inefficiencies have two aspects: one is the task aspect, and the other is the information systems aspect (see section 6.2), and it means that expansions in people's information need is partly a reflection of the state of the organisation's information systems.

a) Proposition 1 – Existence of Dual-Mechanisms

Based on the above perspective, we suggest the important proposition that, as information-seeking is a two-tier process, organisational information systems naturally operate in *implicit dual-mechanisms* to underpin the information-seeking

function. These mechanisms may be known as *primary* and *auxiliary*, where primary mechanisms work to provide task-related data to people and auxiliary mechanisms enable people to contextualise this data. It may be highlighted that *dual-mechanisms* is a theoretical concept, same as the two-tier process, which *does not necessarily* refer to physically separable systems. The duality of mechanisms can be described as following:

- Primary mechanisms provide the content of information, which is the data from which information is interpreted. These mainly refer to *shallow aspects* of information channels where people can obtain data with least effort through straightforward questioning.
- Auxiliary mechanisms enable people to acquire secondary information relating to the data. These refer to the *exploratory aspects* of information channels where people can reciprocate with information sources.

It is important to notice that any system would have the capability for offering both these mechanisms, but in different combinations. For example, a face-to-face meeting might offer capabilities of both data transfer and data exploration, which nevertheless depends on the people who are involved and their circumstances. In contrast, a printed report might offer mainly the data transfer with very little facility for exploration. It can be seen therefore that not all information channels can be explored to the same extent, and these limitations have to be mitigated through other alternative information channels.

At this point, we may refer to theories of media-richness (e.g. Daft and Lengel, 1986). These theories take the general view that people ought to select media of communication depending on the degree of subjective clarification that is anticipated in interactions. It was observed in this research that, even though people operated within data-rich environments, they usually had only few alternatives for acquiring primary data for their tasks, and these channels did not always offer the required level of exploration. The theory that emerged from this research suggests that information-seeking function often evolves beyond data acquisition into further interactions because people seek mitigation to the limitations they found in primary mechanisms.

b) Proposition 2 – Need for Balance in Dual-Mechanisms

This research suggests the second important proposition that, although individual information channels have limitations in their facilities for exploration, the organisation should offer a *balance at broader level* in terms of dual-mechanisms. It means that, even if data is supplied through relatively inflexible channels, people can still exploit them if sufficiently explorative channels are available for secondary information. Or, at least if the organisational context allows people to create such channels.

However, in reality, organisations carry surplus in either of their mechanisms, but most often in primary mechanisms. This has led people having the data but not the 'right kind of information' for their tasks. It may be suggested that this might have led people to ignore data sources, and depend instead on assumptions to meet their time-targets. Having said that, making assumptions through knowledge and experience is a natural course that people follow in decision-making. In such context, data becomes redundant in the sight of people's assumptions unless people have some effective means of contextualising.

Furthermore, apart from data becoming redundant as stated above, high levels of surplus in primary mechanisms risks causing fuzziness. The fuzziness was described (see section 6.3) as the emergence of incoherent information from seemingly valuable data, which was seen as resulting from trust upon the source. Thus, surplus in primary mechanisms can become a typical cause for the overload of non-contextualised data, often from reliable sources, which can cause negative impact on people's reasonably developed mental models. In such context, people might be led to better decisions by making assumptions than accessing data resources. However, for people in organisations, accessing data is not always optional in the presence of proactive mechanisms, and these can cause negative impact if people do not have adequate means of contextualising such proactively disseminated data. Therefore, it may be suggested that while proactive mechanisms can help information-seeking by informing people, they can also cause fuzziness if the organisation carries a deficit in its auxiliary mechanisms.

c) Comparing XD and XA

The above propositions can be further illustrated by a comparison between XD and XA. It may be stated objectively that people at XD were using their *formal data resources* more effectively than their counterparts at XA. The explicit reason was that XD carried a higher level of informality in its environment than at XA. In particular, people at XD had the opportunity of having exploratory interactions with most information sources on an ad-hoc basis, but those at XA had only little opportunity. The nature of help in the former environment was described as 'friendly and obliging', which was true for large parts of people's domains of interaction. Thus, people at XD were more *adventurous* in terms of accessing data resources because they were aware that help would be 'around the corner'. In contrast, those at XA had to depend heavily on formal structural mechanisms that were parts of bureaucratic routines of the organisation. Because of the physically dispersed nature of people's domains of interaction, the nature of help at XA was described as 'assigned duties'. As a result, people often ignored the presence of certain data resources when it came to decision-making because they were aware that support mechanisms were not efficient enough to contextualise this data. Hence, people at XA purposefully avoided situations that would bring fuzziness into their reasonably developed mental models. Therefore, instead of seeking information, people made assumptions that helped them proceed through their daily tasks.

It should be noticed that both these organisations were equally data-rich from an objective perspective. However, they were different from the perspectives of people mainly because the data was more customisable at XD through *personal interference* than at XA where people's capabilities had little power. Therefore, while people at XD avoided opaqueness through contextualising, those at XA did it through simplification and approximation of their beliefs about realities.

Hence, although XA enjoyed a relatively superior technical infrastructure to XD in terms of providing people data, its information systems were more imbalanced than XD in terms of dual-mechanisms. Even XD's mechanisms carried imbalances. But, unlike with XA, primary mechanisms at XD did not indicate high levels of surplus in it, and this can be ascribed to its emerging culture. However, XD is proposing further

improvements to its technical tools, and many see that this would be an alternative rather than supplementary to existing auxiliary mechanisms.

7.2.2 How to Improve Organisational Information Systems?

In section 7.1 it was suggested that improvements to information-seeking in organisations can be defined based on two opposing paradigms. The first paradigm indicates that the reality of information-seeking function is given, and we may only underpin it with suggestions for improvement. In contrast, the second paradigm is based on the belief that the reality may be changed.

a) Underpinning the Generic Function

This research saw that reality of information-seeking in organisations consists of two-tier processes with evolving acts of information-seeking, which appeals for dual-mechanisms in organisational information systems. Thus, within this given reality, it may be suggested that improvements should aim *at least at balancing dual-mechanisms* of the organisation. It was stated previously that organisations may be in surplus with either primary or auxiliary mechanisms, and therefore improvements would involve identifying where the surplus is.

It is suggested that one could inquire into the nature of people's information-seeking acts as a means of identifying the nature of surplus in organisational information systems. It was shown previously that evolution of acts is generic and *not necessarily* a reflection of inadequate auxiliary mechanisms. Yet, it may be suggested that evolution becoming too lengthy or people relying too much on assumptions might reflect the inadequacies of auxiliary mechanisms. It is important to notice that these problems might not have clear objective manifestations, and therefore may be exposed only through inquiry into people's subjective interpretations.

It should be noticed that surplus in primary mechanisms are more difficult to deal with. That is because improvements to auxiliary mechanisms mean improvements to exploratory aspects of people's information systems environment, which often require

changing *organisation's reality*. For example, the extent to which change in culture or routines falls within the scope of information systems development has to be well understood within the broad context of the organisation, and people might discover that scopes are limited in most cases. Hence, the option that organisations will have is to emphasise their formalised systems. It was seen in this research that people have occasionally tried improving systems in isolation without giving much consideration to the broader context of the organisation. For example, Amal's initiative at XA's Business Information Centre had limitations in the context of rigidities in the broader organisational environment. One main aspect of the flow of secondary information is that it is difficult to be supplied objectively, instead has to be searched for by people as a 'personal undertaking'.

In contrast, surplus in auxiliary mechanisms may be seen as lack of exploitation of opportunities to improve primary mechanisms. For example, emergence of softer cultures may be seen as having surplus capacity for people to explore more data resources.

Thus, it may be suggested that improvements to primary mechanisms in organisations have to be carried out with a broader perspective of the state of its dual-mechanisms, which could otherwise have the danger of causing further imbalances in their mechanisms. Such imbalances on the one hand might produce redundant data sources that people avoid using, or rarely use, which would then be a wasteful investment. For example, Rod (XA) once commented *'[The] company spends loads of money to provide us information, but you ask anybody, you will hear complaints [that] people don't have enough information. It is true, what we have is data, I don't call that information'*. On the other hand, improved primary mechanisms might be proactive, and therefore improvements might result in negative impact by causing fuzziness. This is information overload where people have little choice in filtering what they want, and in the absence of adequate auxiliary mechanisms to cope with, people get drowned in pools of conflicting views without having a basis for selecting one view over the other.

b) Can Information Systems Change the Information-Seeking Function?

The alternative paradigm that was stated at the beginning suggests that improvements to organisational information systems may also be seen in the context of changing the generic information-seeking function. One may indeed question whether people can ever avoid opaqueness in data because of the inexplicit nature of their information need, however flexible information systems can be. We may suggest that the nature of people's information need is a reflection, to some degree, of the *proactive aspects* of their information systems environment. It was observed that lack of proactive aspect in organisational information systems might lead people into *assumptions about realities* of systems they deal with, which they discover only during the information search. Hence, one important aspect of organisational information systems is to lead people into selecting right kinds of interaction with information sources by leading them to accurately estimate the need for secondary information. For example, people at XD experienced the change in their information-seeking function when the passive weekly reports system was replaced by proactive weekly meetings system. This change was reflected through statements such as *'you are always in the shake'* and *'it is the push to find out'*, which showed people could not just proceed blindly by making assumptions. In contrast, people at XA lacked such proactive systems in their environment, which led them naturally into making assumptions.

It may be suggested therefore proactive aspects are important in organisational information systems for improving the efficiency of information-seeking. However, it is vitally important that proactive mechanisms are balanced by sufficient capacity in auxiliary mechanisms, which could otherwise lead to negative impact on information-seeking.

In summary, this research suggests improvements to information systems in two aspects:

- Improvements to the proactive aspects that lead people to improve their beliefs about reality, and hence decide their interactions more accurately, and

- Improvements to auxiliary mechanisms that balance the dual-mechanisms and underpin the reality of the information-seeking function within the above proactive environment.

7.2.3 'Information Bartering'[6]

'Information bartering' is a phenomenon that was observed mainly within XA, which may be described as a strategy adopted by people for mitigating rigidities in their information systems environment. This emerged from people's informal communication networks that extended beyond their domains of free-flowing information, which they used literally to exchange information of mutual interest. In other words, people were 'bartering' information.

People used information bartering mainly as an auxiliary mechanism; a reason that may be ascribed to reliability and legitimacy. People generally preferred using formal channels as primary sources. This research saw the existence of information bartering as reflection of people's auxiliary mechanisms spanning beyond their domains of friendly interactions. At XA, people generally worked as distributed teams, and they generally did not feel much obliged to help. Instead, they provided help as duties assigned by bureaucratic routines. Within this context, people experienced having incentives in bartering information, which often speeded up their processes of seeking secondary information.

However, this approach was available only through personalised networks that people had established over years of dealing. Building trust had been a slow process in these networks, and therefore organisations could not expect newcomers to benefit from it until they *'make a few contacts and get to know the right channels'*. These networks often extended beyond the boundaries of the organisation, and sometimes served as *proactive systems* that informed people of what was going on within their business

[6] The term 'information bartering' was adopted from 'risk bartering' that was developed by Ian A. Harwood in his doctoral thesis titled: *Developing Scenarios for Merger and Acquisition Integration: A Grounded Theory of 'Risk Bartering'*, University of Southampton, United Kingdom, 2001.

environment. It should be noticed that 'information bartering' is a naturally emergent phenomenon through the context and organisations can do only little to influence it.

Information bartering was evident even at XD. However, unlike at XA, people used these networks predominantly with external sources of information because their domains of interaction within the company were much friendlier and obliging to help. This phenomenon therefore had lesser value within the context represented by XD compared to that of XA.

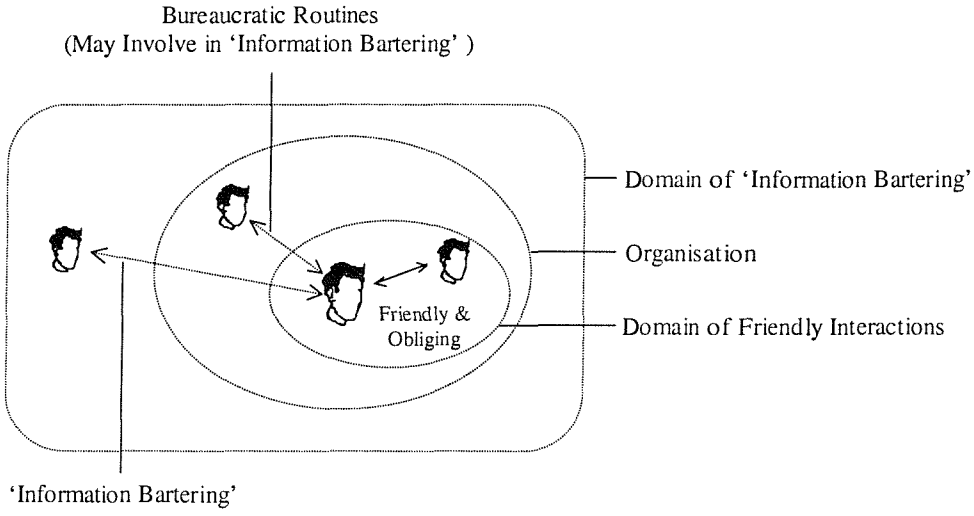

Figure 7.6 – Scope of 'Information Bartering'

Figure 7.6 suggests that while some people are linked mainly through information bartering, some other people who are linked through bureaucratic routines can still be involved in information bartering. The scope of this research is inadequate for us to describe the real impact of this phenomenon, however we may suggest that the extent to which it is used by people in an organisation is a reflection on that organisation's culture and the information systems environment. It may be further suggested that information bartering is one important mechanism underlying 'emergent channels' of communication (Monge and Eisenberg, 1987).

7.3 Contribution to Research Literature

The objective of this section is to highlight how the findings of this research can be positioned within the existing research literatures of information systems, information-seeking, knowledge transfer and organisational communication. The previous two sections discussed our findings from the perspectives of *theory and practice*, and our aim now is to highlight how these might contribute towards developing the existing literature base.

We suggest that our findings in this research should be positioned primarily within the research literature of information-seeking, despite our broad objective of improving organisational information systems. In that respect, we suggest this research has mainly deepened the existing macro level views of information-seeking by suggesting a more micro level view of what goes on. What has been suggested by the existing theories of *channel and media selection* is mainly a *static view* that assumes each iteration in a process of seeking information can be described by the same theory of information-seeking. In contrast, what this research brings in is a *dynamic view* that describes information-seeking as a two-tier process that evolves until a person reaches pragmatically defined fulfilment. This research suggests that it is important to support the two-tier process as a whole, while the existing theories have emphasised supporting individual information-seeking interactions, which we see as the scattered elements of the two-tier process.

Furthermore, in contrast to the existing literature in information-seeking, this thesis exploits the full complexity of the organisational context where information-seeking usually takes place, and therefore the scope of our theory differs from existing research literature mainly in respect to how it treats people as organisational beings. This theory has effectively captured the complex effects of time-constraints and organisational inefficiencies on the information-seeking process, while the existing theories have either positioned themselves within simplified contexts or presented as context independent. We may revisit Table 2.1 in chapter 2 to position our contribution as shown below in Table 7.1.

Table 7.1 – Contribution to Information-Seeking Research Literature

	Macro Level	Micro Level
	MOTIVATION + EXPOSURE ⇨	Mechanisms at Micro level
Theories of Information-Seeking Behaviour	Focused on channel and media selection. These mainly refer to either simplified contexts of presented as context independent.	
Research in Human Cognitive Processes		Focused on abstract phenomena. Based mainly on laboratory experiments.
Research in Information Systems	Focused on how to expose people to information resources. These have used both interpretive research and rationalistic approaches with simplified contexts.	Focused on presentation of data. These mainly followed rationalistic approaches with simplified contexts.
Theories of Media-Richness	Offer prescriptive views through conceptual studies more than describing phenomena.	
This Thesis	*Describes how people fulfil information needs within their data-rich but inefficient and time-constrained environments. Focused on mechanisms at micro level, but with reflections at macro level.*	

Our main contribution to information systems research literature is the theory of *organisational dual-mechanisms*, which we present as a *new paradigm* for analysing information systems in the context of achieving effective knowledge transfer. In its key aspect, this theory makes explicit reference to the fact that people and their environments are inherently inefficient, and it describes how people survive within such contexts by utilising the available resources. This contrasts clearly with existing theories that describe 'how to present data' or 'how to provide accessibility to information sources' because their objective has been to propose systems by trying to *model the imperfections* that are found in both people and their environments. These theories however do not emphasise the *limiting state* that it is inherently difficult to provide 'perfect data' or the 'ultimate accessibility'. In contrast, our theory has been developed by emphasising the fact that *'people do not stop until they reach a certain pragmatic state'*. And, in that context, what we suggest is to develop systems that underpin the natural strategies that people would normally adopt for their survival. Our theory of the *two-tier process* is a description of the generic strategy that people adopt to achieve their information needs, and that *dual-mechanisms* is a way of looking at the technological and sociological aspects of the organisation's

communication systems to achieve practically valuable improvements to its information systems.

The theory of dual-mechanisms can also be placed effectively within the literatures of knowledge transfer. We see that it could contribute by suggesting a useful answer to the question: *'what are the attributes of organisational information systems that are important for the achievement of effective knowledge transfer?';* which is a question that had been answered only at a macro level by the existing research literature. Our contribution is more at micro level. We focus on the key mechanisms of *proactive information-seeking* and *proactive information dissemination* to suggest how to look at the technological and sociological aspects of the organisation if we want these mechanisms to be effective within our personal and environmental inefficiencies.

Finally, we make comparisons between our findings and media-richness theories of organisational communication. Although the previous sections (7.1 and 7.2) have highlighted some similarities between our findings and what has been suggested by the media-richness theory, we see them are as fundamentally different. That is because the latter is focused on static events of *optimum media selection* while our theory of the two-tier process suggests dynamic processes that evolve through the selection of *adequate media.* Hence, we suggest that our findings have questioned the viability of the media-richness theory in a context where people have to select and re-select from a limited repertoire of communication media that is practically available to them.

In conclusion, we suggest that this thesis has made its primary contribution to the literatures of information-seeking. And, based on this it has contributed with a newer paradigm for analysing organisational information systems, which has in turn made contributions to the literatures of knowledge transfer and organisational communication.

7.4 Reflection on Research Methodology

The objective of this section is to assess the methodology adopted in this research project in the light of its findings, and to highlight contribution from our experience that might further develop this methodology.

This research project used interpretivism as its philosophical basis of inquiry and Grounded Theory techniques as a tool for analysing textual data that arose from interviews. The use of interpretivism followed the ontological stance that context relates to people's behaviour through their interpretation, and motivation to seek information is subjectively determined, hence the reality is socially constructed. Use of Grounded Theory techniques mainly followed the need for inductively exposing phenomena and their relationships with the context from scattered experiences of people who participated in this research.

The findings of this research reflected the validity of the above inquiry paradigm. It exposed several phenomena that were implicit in people's interpretation of their information-seeking function. This research suggested that reality of information-seeking function is defined within unique environments that are created by people through their interpretation of organisation's reality through experience. It therefore suggests that objective inquiry of people's information-seeking function would neither expose implicit phenomena nor their relationships with the organisational context.

It may be stated that Grounded Theory techniques in general served an effective means of abstracting concepts and phenomena from textual data, and therefore underpinned the development of theory presented from this research. The effectiveness of these techniques manifested itself mainly in the integration of scattered experiences of people from two organisations to form a coherent theory that described broader phenomena.

However, two problems were experienced in the application of Grounded Theory techniques. These were nevertheless recognised and mitigated; yet this experience can be presented as a contribution towards further development of Grounded Theory

techniques. Firstly, this inquiry progressed systematically following the guidelines suggested by the authors of Grounded Theory (e.g. Strauss and Corbin, 1998; Glaser and Strauss, 1967). As such, it emphasised the concurrency of data analysis with data collection all throughout the inquiry. The inquiry began with only four people selected initially at XD, and then evolved through theoretical sampling, where perspectives emerging at each stage led the inquiry at its subsequent stage. However, because of the lengthy time gaps between interviews, and also between different stages of the inquiry, it was noticed that certain interim perspectives were beginning to stabilise within the researcher's mind, which developed an implicit bias that might have confined the thinking process too early in the inquiry. We noticed the danger that the inquiry was 'digging into phenomena' with lesser emphasis on understanding broader issues.

This problem was however identified by the researcher through discussions with fellow researchers. As a result, the researcher explicitly emphasised letting concepts 'bloom' at initial stages of the inquiry. This was found difficult, mainly because the timeframe of the inquiry was too stretched so that the emergence of perspectives from concepts was inevitable. Hence, the researcher mitigated the problem by making explicit efforts to increase the breadth of the inquiry where interviews were made lengthier and often deviated from the central theme into investigating wider issues.

Thus, based on this experience, we may contribute with a suggestion that might sound contrary in some aspects to the views of Grounded Theory authors. It may be suggested that, even though the concurrency of data analysis and data collection is important in Grounded Theory, this approach should pay attention to the *timeframe* of the inquiry. If the timeframe is *too stretched*, it may be suggested that following the above systematic approach might be disadvantageous because it might lead the researcher into a narrow view of 'what is going on'. Therefore, in contrast to the systematic approach, we suggest that the above problem may be avoided if inquiry is carried out in *blocks of interviews* at its initial stages without too much emphasis on analysing data concurrently. In that way, the inquiry would lead to exposing large numbers of concepts at its initial 'open coding' process. The researcher might feel 'drowned' initially, but this would lead into a broader view of phenomena. This may be described as the 'funnelling effect', meaning that perspectives are converging from

a broader basis (Figure 7.7). The researcher should, however, revert back to systematic approach in subsequent stages of the inquiry for gaining insights into these emerged phenomena.

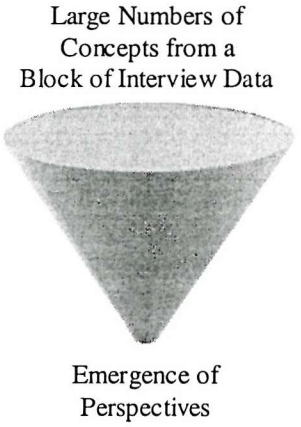

Figure 7.7 – 'Funnelling Effect'

Secondly, this inquiry suffered from a lack of structure beyond the initial process of 'open coding'. This can be ascribed partly to the researcher's lack of experience in using Grounded Theory techniques. However, the problem was mitigated through the researcher's experience in using techniques such as rich-pictures, which were used in this inquiry to make sense out of many concepts that emerged from the open coding process. Such techniques are not referred to explicitly in Grounded Theory. In hindsight, the researcher could have explicitly followed the path suggested by Strauss and Corbin (1998, 1990) from the outset, which emphasised the interim technique of 'axial coding' to structure the process of thinking. However, whether from such approach would emerge the same phenomena is a question that cannot be easily answered, unless the inquiry is repeated by a different researcher. Our experience in this project suggests it might be advantageous for the novice researcher who works within a finite timeframe to follow a structured approach as suggested by Strauss and Corbin.

7.5 Limitations of this Investigation, and Issues for Further Research

This section highlights several areas where further research could make useful contributions. Some of these are drawn from limitations of this research, some concern methodology, and some are inspirational.

In suggesting further research issues, we may position the findings of this research within the broader objective of improving organisational information systems. It is important to highlight the domain of our empirical investigation. The phenomena that were exposed in this study were the interpretations of middle to senior management within two organisations, and therefore it cannot be claimed that these are *generalised organisational phenomena.* Instead, we can only claim these theories to be substantive to the above domain of investigation. However, in drawing implications for organisational information systems, we assumed a reasonable extension to these theories beyond its domain, and treated them implicitly as generalised organisational phenomena. This extension was neither empirically nor conceptually grounded, but without such extension it is unable to draw implications towards the broader objective of improving organisational information systems. Therefore, as part of suggestions for further research, we highlight the importance of broadening the scope of the theory that emerged through this research project. For this, our contribution is presented with respect to three specific dimensions as shown in Figure 7.8.

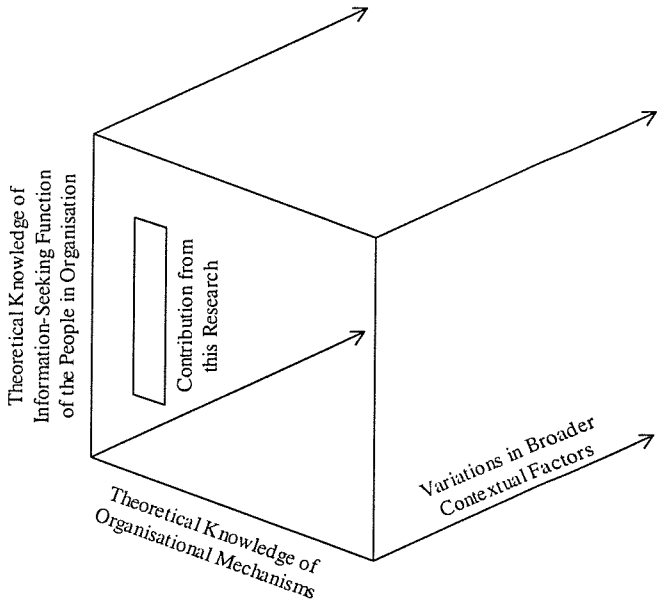

Figure 7.8 – Scope of Contribution

The first dimension represents the theoretical knowledge of the information-seeking function. It highlights the fact that the theories which emerged are grounded within a domain that does not represent the entire organisation. Hence, it suggests the need for either empirical or conceptual extensions to this domain through deductive approaches.

The second dimension represents the theoretical knowledge of organisational mechanisms. This research project did not investigate these mechanisms empirically, but made inferences regarding these mechanisms at conceptual level from emerged theories to draw implications concerning organisational information systems. Inferences were made regarding the existence of dual-mechanisms and proactive mechanisms, and their interplay, which should be seen as hypotheses in further empirical research.

In particular, the proactive mechanisms were suggested as part of the concept of connectivity (see section 1.1), and its significance for the information-seeking function was observed (see section 7.2). This can be suggested as an important and interesting area to research because people in certain contextual settings seem to enjoy the benefit of being ignorant while the others are kept constantly 'shaken'. One aspect that can be suggested for empirical investigation is gaining insights into how proactive environments appeal to the balance in organisational dual-mechanisms.

The third dimension represents the variation in broader contextual factors. The theories from this research are drawn from two different contexts, but they still remain substantive where we cannot claim for generalisation. This opens up for further research where the theories can be extended either empirically or conceptually into other contextual settings.

A further important area for research emerges from the experience with Grounded Theory methodology. It suggested the importance of the 'funnelling effect' at early stages of the inquiry as opposed to concurrency between inquiry and analysis. The significance of this suggestion, however, has to be established through applications in other research projects.

Finally, we may wish to question our own premise. This project inquired into the generic information-seeking function, under the implicit assumption that it exists within the contextual setting that we researched. It may be suggested alternatively that the generic function is not context-depended, but resides in people's habits and lack of adaptation to change. Even if information systems are greatly improved, people might still continue with their habits, and therefore not change the generic function. This is another useful area to research.

7.6 Conclusions

This research project was undertaken with the broad objective of improving organisational information systems for the purpose of underpinning people's information-seeking activities. It was inspired by the observation that a new paradigm has been emerging in the corporate world to expand information resources that are available to individual decision-makers. A key aspect of this paradigm has been to create an environment for efficient seeking of information, and therefore the organisational information systems within this paradigm has to be evaluated in relation to the nature of people's generic information-seeking function. Thus, the specific objectives of this research were set to develop a theoretical perspective of this function, which can be used as a basis for suggesting improvements to organisational information systems.

Outcomes of this research exposed several phenomena associated with information-seeking in organisational environments. Fundamentally, it suggested that information-seeking is not just searching data, but it is a two-tier process that includes the auxiliary process of preparing the mind for interpreting data in the appropriate context, which we called contextualising. The theory that emerged suggested that people's information-seeking function depends primarily on the scale of this auxiliary process, which in turn depends on the inefficiencies of search-supply mechanisms. Furthermore, people's behaviour in seeking information is determined fundamentally by their assumptions, speculations and approach towards this auxiliary process of contextualising.

Based on these findings, it was suggested that organisational information systems usually carry implicit dual-mechanisms that underpin people's generic information-seeking function. It was also suggested that improvements to information systems should concern maintaining the balance in these dual-mechanisms, particularly not to create too much surplus in primary mechanisms, which could otherwise have a negative impact on people's decision-making confidence.

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Appendix A

Shown below is part of the transcribed script of an interview between researcher and the director of the southern region's Customer Business Unit, alias Louise, at the company XD (12.08.99). It is shown here to demonstrate the 'open coding' process, which is part of the Grounded Theory analysis. The complete script of this interview is not published here because it contains material that might be confidential and personal in nature.

Q. As the director of this CBU, you interact within the unit as well as within the company...

We are not just a sales unit, we have sales, marketing, medical, human resource all of that within the unit. Although that it has mainly sales people in it, it is not just sales function. It is almost like a mini company within the company. (why there is a medical personnel just for the unit, isn't it the same knowledge for all the other units?) It is different, because if you are managing something nationally, by very nature of that you are managing people who have a national importance. When you are looking at things at a more local basis, you get many more people you need to know through local opinion leaders. Therefore, to be able to understand and truly know the opinion leaders in your locality we need medical personal situated within the CBU as well. (is he a doctor?) Not at this particular moment, we will have a doctor joining us, this moment of time it is a pharmacist.

Q. If you consider your CBU and the outside of it as two separate, what level of knowledge sharing would you like to have?

I fundamentally do not believe it is separate units, so I comment on the basis that we are a unit within XD, and therefore we should not exist as a separate unit. Although we have responsibility to a specific locality, the sharing of knowledge has to go on between the office and CBU at all levels. Because the things happen nationally has importance to our CBU, and things happen within our CBU has importance nationally. All our strategies for our brands are developed nationally, then implemented locally, therefore be able to implement you need to clearly understand what is going on nationally, and very much a two-way process of communication and sharing of information, and use of that information which of course is the most important thing, and has to happen continually, and has to happen two-ways. If we do something in our CBU that we do not share with other people therefore as an asset as basically we not using as properly as we should.

Strategy brokers

Q. How do you like this sharing to take place?

It is something we not that good at currently. When you have piece of information or you gain a piece of information that for example that (a formulary?) in Southampton have our product on.....Hospital in Southampton put our product on formulary, who needs to know that information, and I try to encourage everyone that every time they get a piece of information, or learn something, to think who else can benefit from this particular knowledge. There is tendency for people to think no one else is interested or nobody else needs to know that. Use of word of mouth, use of email, and in lots our different areas we now started to put together databases of that information, and the up-keep of those databases has assigned to specific individuals. And it is something that has to be done regularly, so it is really just mainly word of mouth, email and the telephone.

Contextual

Explicit/formalise

Q. These databases, are they little local one owned by groups?

It depends, some company wide ones, all our databases are CBU wide in terms of health authorities, in terms of primary care groups, in terms of key opinion leaders, all of those things are kept locally. But they are accessible by other people. (is it accessible by anybody in the office...) well, no, not anybody, and that is where we found out, because you have to know that database exist at the first place to ask, I know what exist within the CBU, but as a company I have no idea, I have to go around people and ask who might know what databases are held. Our business intelligence department is my first port of call because with regard to most information they have a project up and running currently looking at the whole knowledge management. And at this moment in time if something that I need, they are my first port of call.

Islands of knowledge

Easily accessible (but not sure whether the information exists)

Q. What sort of service you like to have from BI unit?

I am not sure at this moment in time I can ask anything more often because everything I want is in the process of putting together, until I've seen that up and running I am not sure I understand the full potential of that. What tends to happen is once you given something, you think whaaaaao, hey that's great for this, can it do this, no it cannot, OK how we get to do that, so it tends to be building on. At this moment in time what knowledge, what information we have within the company, how do I access it, and where is it kept, and that's the three things I don't know enough about at this moment in time. Once we got that set up I'll be looking at, right, what are the decisions.....you know, everything I want there?, no it is not, right, how we get that. But it is easy access from one central, I mean we are currently using disk drives, and s-drive....all the lot.....and accessing that on a regular basis and

Inexplicit information need

Opaqueness in accessible knowledge

Limited use of explicit knowledge (can be the result of inexplicit information need)

getting that in your mind to do that is not a habit yet.

Q. The information you get from the CBU, how often they come in the form you want?

It is difficult to quantify because, a vast majority of time umm....when new report is being put together, business intelligence department asks us if it is suitable in that format, or what would you like. Sometimes I am not sure what I like until I see it, and then decide I like the way it is ahhhh....which is a little bit roundabout way to look at it. But in essence, very, in general.....monthly reports I am perfectly happy with. It is one-off presentation are, one-off requests, that is where the difficulty is tend to occur. Oh, actually I want in this format. But I have to say that our business intelligent department is very good at doing that if they can do that. Sometimes I think people like me are a trouble to the Business Intelligence. We sometimes don't know what information we need exactly....We ask for what we think is useful....Yesterday I asked Linda to put clients who used L [the brand name deleted] last year on a monthly chart, but actually I should have asked her to get the details of clients who used both L and S [brand name deleted]. But, I didn't realise it till this morning. I am bit relaxed on this, but I feel I am going to be a nuisance now

Inexplicit information need

Familiar systems → Explicit need

Unfamiliar systems → Inexplicit need

Customisability → may be cultural

Inexplicit information need

↑ (still)

Relatively known systems

Reluctance to repeat interactions

Q. This office set up is simple, you are sitting here, business intelligent people not sitting far from you, but if you consider a different situation....

I should stop you just there because, I am only sitting here while I am waiting for the offices to be built, our new office, two out of the three CBUs, Andrew has a office in Manchester, CBU north has an office in Edinburgh, and I am going to an office down the road. So we are not going to be centralised at all very soon. Certain functions will be centralised. But having said that, even our marketing function is not centralised. Because we have marketing in CBUs as well. There is a head office marketing group and CBU marketing group. So the strategy is devised nationally, the implementation is not, that is a consultation between CBU and the central marketing.

Q. If you are working in a larger environment, as in your US counterpart where business intelligence unit is not nearby, what sort of problems will you expect?

The biggest problem I see will be ahhh... you can't pop around and ask, so everything become a bit more formal. Communication is not personal, because, even if I am moving down there, but that is still physically separate. I will not be able to have as much interaction as I do now. I can shout at them from where I am now, but soon I will have to rely on the telephone and e-mail....it will be the phone most likely. It is very easy at this moment. When I am in

Pop around → informal interactions
Physically separated → becomes formal

Prefer talking → informal interactions
(may be cultural)

the new office, it is going to take five minutes walk, which means that I have to consciously get out of my desk, I've got to consciously walkover, by the time I get here I will have spent at least half an hour away from what I am doing. Currently I can do it in couple of minutes. So if I know it is going to take half an hour to walkover, I am going to do that less than I will do currently. So I am changing the dynamics, the parameters of our sharing of knowledge. It will not happen as regularly as chatting. I will consciously have to make the decision to do it. So, therefore, I will either do it less often, or I will have to be much more precise in what I do, because it will not be that easy to run back and forward for them to ask.

Reluctance to clarify → Is she going to make assumptions?

Reluctance to interact → Alternatively assume

Q. Do you believe in keeping a person in the CBU when you are out to dig up information? Is there a strict need for that?

Not at this moment in time. Each person is responsible for digging up the information they require.

Personal undertaking (information-seeking)

Q. What is your opinion about Business Information Group?

I think it is still too early to judge the full potential of their service. It has improved quit a lot, but I think they killed some of our good informal resources. I think they try to be at the shallow end of knowledge management, but I am not very sure how useful it will be for us, we are too organic to rely on a technology model. But, I use their online database, it is sometimes useful to fill the edges.

Preference for informality
(Is it because of inexplicit information need?)

Change too quickly?

[Material ignored due to irrelevance]

[I explained the two extremes to her and asked where she would locate herself?]

I think there is a bit of everything. I think you have to have the trust of your colleagues. If we re truly sharing knowledge, you have to let go some of it. You have to assume, because, every time finance came to me with a figure and I want to know how they got there, to me that shows a lack of trust in their ability to get the right number because in essence I don't need to know how they got there, I need the number to go and do the, for example, if I say, right, I am trying to cut costs, I overspent, right, tell me exactly how much I have overspent. I need to know that number because then I need to know where I can make cost savings. If they gone and explain everything, may be I need to understand how they got that figure because then I can get more ideas how to cut costs. But in essence I don't always need to know all of that, and if I spent every minutes trying to find out how they got that, I will not move forward with anything. So I think there has to be an element of trust with your colleagues that they have the capability and ability to

Trust on source (do interactions become brief?)

Familiar systems → brief interactions

Assume rationality in the process? There is a standard way of getting the number, so not bothered.

Confidence in pre-knowledge ← experience?

Superficial view → fragments the knowledge?

be able to get the right number.

Q. Don't you think that fragments your knowledge when you analyse a situation?

Yes it can, but I think you have to analyse the context and put you getting that information, for example, being the director of the unit, I don't need to know absolutely everything that is going on within that group, because precisely I don't have the time to be able to know everything. There are certain things, yes I want to know the details because of the significance of that, but I think at some point you have to make your own judgement about what you need to know more about, and what you don't want to more about, because again it is back to doing everyone else's job, I have to be able to trust my field sales manager that he knows what all the regional managers are up to, or why they are getting good sales results or why they are getting bad sales results, so that when I want to know that I can ask him, or else I have to ask six people. There are times that is the right thing to do, but in essence, I always think if I need the knowledge, as long as I know where to go and get it, that to me is very comfortable. I don't need to everything.....again it is back to the trust thing and again it is back to the fact that I know where the information is available, I may not know what the information is, al least I know it is available and people can get it, and that to me is enough because at the end of the day if I know absolutely everything about everything again it is back to the time, also I am not interested about every single detail, I have other things to do.

Rationality in system / familiar / slow change

Dependence on pre-knowledge or dependence on the system?

Knowledge of availability and accessibility

Is it important to know the level of interaction that you can have with a particular source of information?

Fragmented knowledge (still acceptable under the circumstances. This may be dependent on personality factors)

Q. Apart from time, what other factors will de-motivate you from seeking comprehensive knowledge?

Lack of interest. It is true, at the end of the day, it is not the lack of interest that it is boring or whatever, it is just, it is more from the point of view that particularly the jobs you have done yourself and know how to do the job, you don't need to go back and find every detail because, if I need a piece of promotional material, I know how promotional material are put together, all I want to know is do we have some at the end of it, yes we do, so that reps can do their jobs. So if there is anything about that, yes I will go and talk to the individual who knows the ins and outs who be able to tell me when that information is available, and that sort of thing. Again it is back to the idea that said at very beginning, I think as long as you know where to find information and know who got that information, to me that is good knowledge management. I don't need to personally have it all, but I need to know where to get it.

Familiarity? (pre-knowledge)
(People lack the interest to know when they think they already know about it)

Unpredictable → detailed talk
(otherwise assume the normal functioning)

Indexing knowledge

Q. If personal relationships are too formal does it affect getting knowledge?

Yes, but I don't find it in XD, there is no one this organisation in the UK that I would hesitate going and knocking on the door and asking, if I think they know or if I need their advise. I may hesitate with some people about doing it immediately. I may phone in advance and say is it convenient for me to come and talk. But, to be honest there is very few people in any work of life if I thought that they be able to give me the information that I needed, I may be less formal with some people I may just pop my head around the corner, some people I may phone in advance and say could we meet, or I may write to them, but they are all out with the company. But, how I go about will differ, but I would not hesitate with anybody to go and ask. The worse they can do is tell me to get lost. But, I must say, we have a talking culture here. I am not reluctant to knock on somebody's door to ask questions. I mean, sometimes they say 'can you come in five minutes', that is fine, but no one says 'send me an e-mail'. So, if something is not making sense it won't take you that long to get it sorted

Friendly and obliging (cultural)

Knowing the level of accessibility

'Talking culture' → easy clarification

↓

Repeatable interactions

Q. If you find a person who is reluctant to talk, or not confident in talking, do you give up?

Yes, eventually you will do. If somebody make it very clear they cant people dealt with you, or if somebody is rude, if you ask a question and they give you the very bear minimal answer, yes you will stop going to them eventually. The other is also true. If every time you go and ask somebody a simple question, and only want simple answer, they take ten hours to give that answer, you also stop going to them eventually. There are some people in this organisation that you say to them, you know what the colour of this, and you just want simple answer, but they insist in telling you everything about it. Sometimes you don't need to know all of that. I often think it is the responsibility of the person to ask, sometimes we are lacking courage to ask each other questions. We make assumption that people are not willing to help. Very often people are not willing to help because you have asked in the wrong way, perhaps inconvenient or a busy time, doesn't mean they will never help, it just mean inconvenient at that time. I have noticed people take it personally. You say come back later I am busy right now, and they never come back. There is some other point, with human nature we like to act as we know everything, we often don't like to tell we don't know. One of the blindingly obvious things to me about trying to find things out is to admit that you dot know the answer, because too often people will say something like you know using abbreviation, you sit down and think, what on the earth you are talking about, and you know people around the table don't know either, you think why nobody is asking, and when you do you have done a favour to everyone else. If people don't

Lack of repeatability
(This can be a problem concerning communication skills)

Inflexibility in the source

Lack of communication skills?
(Can people manipulate conversations?)

It appears that having face to face meetings may not always be helpful in clarifying the wrongly interpreted information. This is more likely a cultural issue than a media issue.

ask what they don't know, wrong assumption can be made, knowledge being not truly shared with each other because we all have picked up the wrong thing.

[there were few other good points Louise brought in, but she requested I switch the tape recorder off because they were a bit critical on the company and her colleagues]

Q. How would you explain your life as a decision-maker?

Extremely busy and stressful, that's the best way to describe. We make too many decisions, things change every week now. Somebody phones you and says, so and so is not using our products any more, or competitors have allocated more staff in our area, or it could be many other things. You want believe what things we have to worry about, and we react to this information and have to make right decisions all the time. That is where our time is spent. But, I must say, it has become quite efficient now, decision-making I mean, CBUs have more power. Not like what we had few years ago, the culture here is now decisions are made inside little rooms, not in the conference hall. But we have lots of meetings, talk about things, and then go away and decide. I usually call one or two people into my room and they tell me if there is anything seriously wrong in my decision. All directors do the same thing. There is nothing wrong in it as long as everybody is informed. Even just short message helps. We are good in that, decisions are published, you definitely get the e-mail if you happened to be in the meeting.

Decision-making is a personal undertaking

↓

As opposed to decision-making through voting for alternatives. I think people depend less on their mental models in this latter case.

Q. Can you tell how you go about finding information for any particular decision?

We make so many kinds of decisions, some are a bit routine, what kind of decisions are you thinking of?

Q. Say routine decisions, how would you find information?

I can tell you a simple example, but this is something where we can have lots of problems. It is like this. I have to publish a monthly sales forecast for our sales region every two weeks. All CBUs have to do this. You must understand, in UK we have mainly the company's sales function, and that is why CBUs are so important. Our activity schedules based on sales forecasts, and other support functions like marketing, business intelligence and even therapy teams have to support our schedule. Company got sales targets for the year, they are brought down to monthly targets, and we try to meet these on fortnightly basis because we can easily lose control. So I have to get the forecast right. Now, for this I need information. Some I can easily get from business intelligence, they have big databases, but the problem is they cover only our main brands. These products have been around for years, and to

Explicit information need
(This seems to have arisen from a familiar system)

be honest I don't need a database, my gut feeling is more than enough. The real problem I see in newer products. My sales formula don't work very well for these, not in the short term because our sales depend on health authorities and I can't judge for sure what is going to happen. I can still come up with a reasonable forecast, but sometimes it can be little dangerous, if you know what I mean. Now what we all do is ask field reps to give some idea. These people know what's happening within their locality so they can do better guess on ups and downs. You see, it is a very good source of information so I have a standing request for them, every two weeks they have to e-mail me their predictions.

Familiar systems → depend on pre-knowledge ('gut feeling' is another way of saying 'familiar systems')

'Sales formula' → familiar systems

Unpredictability (could occur even in familiar systems)

Standardising interactions
(Pre-defined interactions that are not done on an ad-hoc manner)

Q. So do you compile your forecast based on their predictions?

Not exactly. I can't rely on them totally. What sales people want is to get their efforts published more than to supply information for our work here. Main reason I see is they don't experience this environment, so don't see the importance of all this other stuff we do here. These people usually have a narrow vision of everything, their view is, if the selling is sorted then everything is OK, but things don't work like that. So I never get more than half the responses I expect to get. You can't blame the sales staff for this, they are in a different environment, completely different mind-set and they forget most of the time. So if whatever the stuff I receive make sense, then I go ahead with it. But, for that you need to have a good idea of what is going on, so I don't wait till reps send me information, I have to find out from my other contacts. So when reps send me their opinion I only have to check these with my estimate. Not everybody can do it in that way, I know some people who are reluctant even with 80% responses. There is a good personal element involved in this.

Cultural conflicts
(communications skills might be the solution)

Fragment knowledge → still OK to proceed

Familiarity

Pre-knowledge → can afford fragmentation?

Dependence on personality factors

Q. Would you be more comfortable with 80% responses?

It depends, not the number of responses that matters. Reps are a good source of information, but you cant weigh everybody at the same level, these people try to be smart, they sometimes send you all sorts of unnecessary stuff just to impress you. But, you tend to learn how to value each person's opinion. Whenever, I get some numbers or any other information, I always check who sent them. There are a few guys I always like to see providing this information, and I am a bit reluctant...ummm...say I am less confident if some of these people are missing. The information may be perfect, exactly what I wanted, but.....it is like a jigsaw with pieces missing. That is a good example, in fact we are putting together jigsaws, and that is what decision-making is. You get your jigsaw sorted then it is a fairly easy job. But, the problem is you will never get your jigsaw sorted, it doesn't mean you can avoid making decisions. I think we all have personal strategies, how to proceed, how to avoid

Trust on source

Fragmented knowledge
(Is it only occurring with familiar systems?)

Fragmented knowledge (still OK)

Pragmatic fulfilment

problems, that is why we need experience.

Q. Say for instance, you cannot get your jigsaw sorted, what would you do?

You will never run out of information in this company, that is for sure. But, there are times when information is really foggy, don't tell you anything. I mean information doesn't match, and ideally I should check with each and every person on site, but that'll go for ever. So, I go by the figures given by few people, I have a good regard for them because I know them socially. One of them used to row with me [she pointed at a picture]. Sometimes it doesn't work, but that is the best we can do, we don't have awful lots of time for this clarification work. That is why I said we have our own strategies, risk taking is a part, and I think that is the only reason why these organisations don't collapse. I think it is important you taking risks with some broad understanding of what could happen, you must know whether the organisation can tolerate, and I think it is essential when you dealing at my level of responsibilities.

Data rich

Incoherent information
(wrong interpretation, why?)

Trust on source

What would be done, make assumption?

Clarification of interpretation
(This can be a reason for incoherent information)

People carry the organisation
(Alternatively, organisation shelters people)

Q. Do you have to ignore information?

I try not to, but sometimes you cant really help. First I try to ask a few site people. I have few key people whom I know very well, and I ask them what is going on. They can help me out most of the time. It is not good when information tells you something else, not what you expected. I have been in this business for so long, and I have the 'gut feeling' of what is happening, but still you can't ignore the information because even reps have experience, and I have a respect for these guys. People don't always imagine things, and I believe it is just a matter of finding reasons to explain differences in opinions. I must admit, sometimes it had been my own narrow vision, because, just imagine, you always start thinking you are right, but sometimes you forget to question your own opinion, and you might keep on questioning other people's opinions without realising actually the error is with you.

Incoherent information
(Incoherent with own opinion) → familiarity

Distraction than help

Clarification of interpretation

Pre-knowledge / well-developed mental model

Q. How do you come to know your error?

Sometimes it comes to you automatically, or it comes when you talk to a sales guy. It all depends on the information. When things are not clear, and you have only this much of time [she used gesture to imply limited time], you don't want to take the risk just going up and down the same information again and again and again, and still end up with a lost feeling. So you need to ask somebody, I mean, if there is someone you could approach, you will do that wouldn't you?

Sufficiency in intuitive capacities

Clarification of interpretation (required)

Seek help, why?
(Time constraints may be only one reason)

Q. So, why don't you get sales personnel to phone you with their information? Then you don't have to struggle later on.

Yes, it is nice to get this information over the phone, so I could at least ask a few questions and know what is going on. That is sharing knowledge, but that is not very important, I know what is going on most of the time because I have my own intelligence system. It is only in a confusion I need to phone, then I wouldn't waste time just thinking over the information because I get the feeling that I am not going anywhere, but, still I wouldn't try to phone everybody. And there is a culture problem. I want to deal with sales staff without loosing respect. One of my colleagues [Andrew] deals in different way, people are dead scared of him, but I don't want that. Accessing them is not a problem, I can get them fairly easily on their mobiles, but as the director I don't want to become too much of a nuisance, phoning every other week to discuss numbers. I know how people talk about these things. I rely on e-mail, and hope for quick replies. These people do a good job on site, so we don't want to put any conditions they don't consider important.

Pre-knowledge / familiarity → Prefers brief interactions

Incoherent information

Data gives some context-related information, but incoherent with the own view.

Communication skills

But there are bad times I feel I am losing grip, and I don't wait for reps to send me information, I phone them because there is no time for confusion. These things don't happen regularly, but sometimes life can move so fast, this place is nothing like what we had two years ago. You can't hold your opinions for too long now....Its good, I am not complaining, but sometimes you feel its too fast, and you need some space to think, just lay back and think....and, that is exactly what I don't get. I can't wait for things to happen, I have to push.

'Losing grip' → Lack of clear pre-view.

No space for incoherence

Proactive?

Q. Why do you think this change?

I think it is our new culture. My day is flooded with meetings, I feel too much sometimes, but on the other hand I feel I am better informed. Before this we had a weekly report system, and that was useless. People hardly read weekly reports to learn things, it is boring stuff, you know. People use them only when they have to find something. But, weekly meetings are much better, you are in the shake, sometimes you get confused, but that is the push to find out things. These are very informal type of meetings. No minutes, only action points, so we keep it simple, I mean these are not to blame anybody, but just to get the job done. Fanciest thing is that it is not compulsory to attend, not like NASA, but people have got into the habit now. I am sitting here talking to you now. Next minute some one call me for a short meeting, I can't say no! because next time it could be me. But I am beginning to appreciate this because I get more interactions whenever I need. We must think, our knowledge is not always good enough, so if what you

Passive systems
(Alternatively, systems can be proactive)

Proactive environments
No space for assumptions

Ad-hoc interactions → greater flexibility

already know is not good enough to make decisions, then you got to think about what you ought to know and try to move there. But the problem is most of the time you don't know what that is....the only thing you can do is follow hints and find the information, and that needs lots of interactions. I believe we are now transforming into right kind of environment for that.

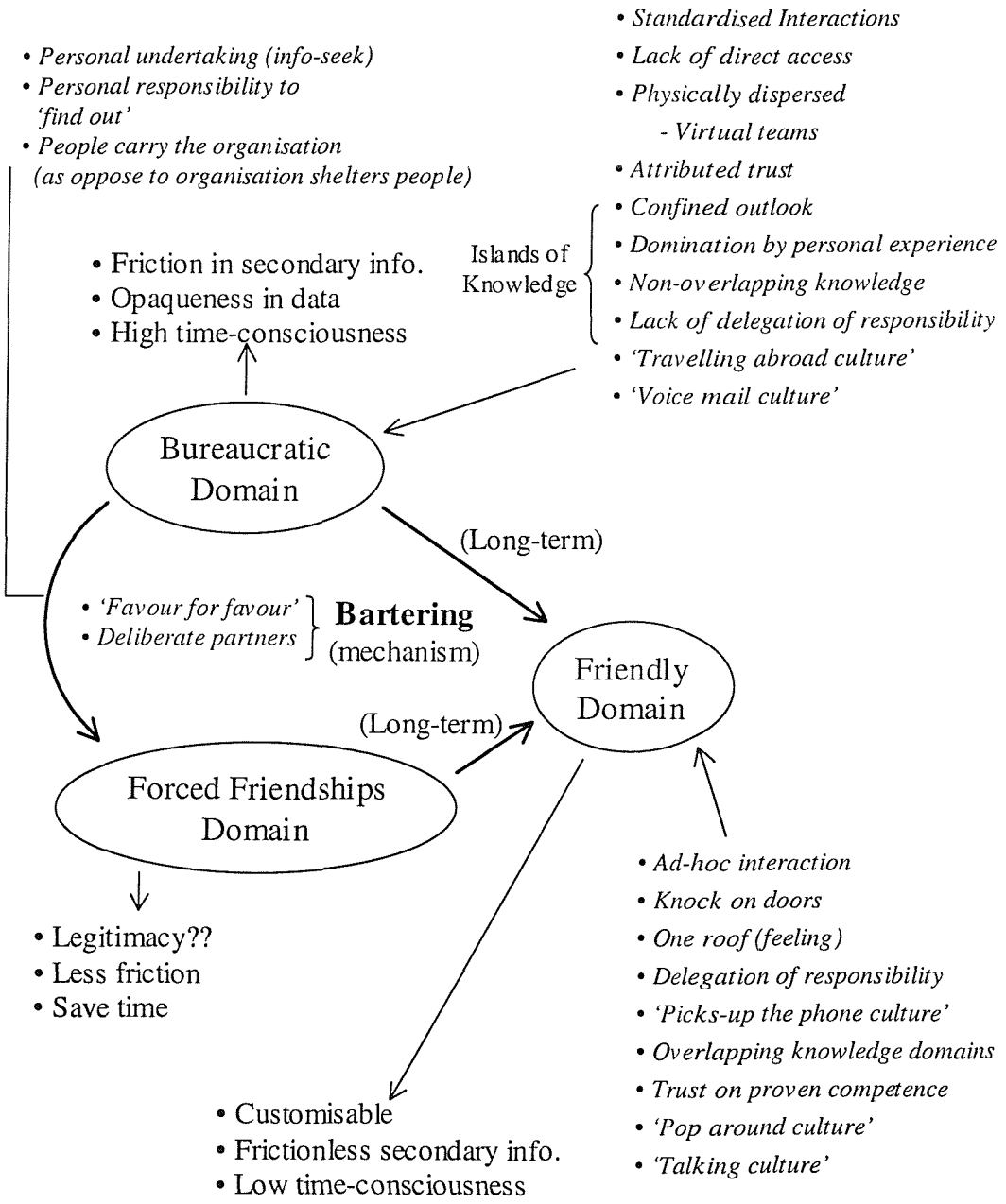
Inexplicit information need

Search-clarification loops

[Material ignored due to irrelevance]

Appendix B

Example of a mini framework (from field notes) that helped the emergence of perspectives from the data. Shown in italic are some of the primary codes that resulted from 'open coding' in the Grounded Theory analysis.



Appendix C

C.1 The Structure of Interviews

The focus of the interviews evolved over the period of the inquiry following the emergence of various perspectives from the Grounded Theory analysis. Preliminary interviews carried out at XD were guided by a pre-determined structure, yet there were many instances where the researcher deviated away into investigating important issues. This structure comprised a list of topics to discuss as shown below. It should be stated importantly that this list provided only a guideline for the interviewing process, and the questions were raised on site more fluidly based on the personnel involved and situations faced.

- The person, the nature of work, responsibilities and how he/she is positioned within the macro and micro contexts of the organisation.
- How the person interpret the nature of his/her work environment?
  - How do he/she interpret time constraints?
- How the person interprets the nature of his/her relationships with the others in the organisation?
- How the person interprets the nature of relationships amongst others in the organisation?
- How the person relates the information environment to his/her work and duties?
- How the person interprets data, information and knowledge?
- How the person interprets the value of information channels in the environment?
- How the person interprets their decision-making tasks? How much do they know about the consequences?
- How the person goes about seeking information? What information channels they use, and why?
  - What the person would do if a particular channel fails to provide information?
- When does the person have to make assumptions? How does he/she feel about it?

C.2 The Schedule of Interviews

Name	Company	Date	Name	Company	Date
DS	XD	08-12-98	SS	XD	11-08-99
LG	XD	08-12-98	SC	XD	13-08-99
PU	XD	12-01-99	MR	XD	23-09-99
SS	XD	03-02-99	PU	XD	23-09-99
AD	XD	09-02-99	JW	XD	03-11-99
MR	XD	12-02-99	LG	XD	12-11-99
SC	XD	01-04-99	DS	XD	17-11-99
JW	XD	06-04-99	AA	XA	19-11-99
TK	XD	08-04-99	TK	XD	26-11-99
IH	XA	15-04-99	SS	XD	10-12-99
AA	XA	15-04-99	RM	XA	13-12-99
JP	XD	29-04-99	IH	XA	13-12-99
ML	XD	13-05-99	MR	XD	20-12-99
JB	XD	14-05-99	AD	XD	21-01-00
AD	XD	03-08-99	SC	XD	15-02-00
JP	XA	05-08-99	JP	XD	15-02-00
RM	XA	05-08-99	AK	XA	17-02-00
AK	XA	05-08-99			