An Investigation of the Collaborative Aspects of Information Seeking

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Abstract

This thesis develops a model of collaborative information. The model is built from an analysis of data collected from a collaborative information seeking and information analysis study (the Command and Control Support Study) undertaken by the Defence Science and Technology Organisation (DSTO). The main argument made by this thesis is that the information seeking activity performed by a group, is different from information seeking activity performed an individual.

Previous literature describing information seeking has so far focused on individual information seeking with little literature focusing on collaborative information seeking.

The model of collaborative information seeking described in this thesis was developed from a retrospective, Grounded Theory analysis of the Command and Control Support Study. Data was collected from the meeting minutes and via semi-structured interviews with participants involved in the Command and Control Support Study. The data was analysed using a Grounded Theory methodology, and a model of collaborative information seeking developed.

The impact the collaborative information seeking model may have on the development of information seeking technology is discussed. Several potential technological implementations are also described.

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1 Introduction

Formal research into information seeking has been conducted for over 50 years, and has progressed from the initial views of information seeking as a mechanistic goal driven process, through to current cognitive and behavioural views of information seeking (Ellis 1989). Information seeking forms an important part of many human activities, ranging from decision making and problem solving through to resource allocation and system management (Rouse and Rouse 1984). As an area of research, information seeking ranges across many disciplines, including psychology, library and information science, and computer science. Each discipline has it own set of models, perspectives and assumptions that attempt to define and describe information seeking (Brown 1991).

Past research into information seeking has generally focused on the information seeker as an individual, and examined the activities, roles, behaviours, methods and processes an individual uses to locate and gather information. Little work has been done examining the information seeker as a group, that is, collaborative information seeking. The goal of the research described in this thesis is to examine collaborative information seeking, and to describe information seeking from the perspective of group activities.

This thesis takes a multi-disciplined approach to examining collaborative information seeking. The outcomes of this work are intended to assist the development of information technology to support collaborative information seeking. However, this research makes uses of tools and approaches from sociology and the softer sciences to build a human centric model of the collaborative information seeking activity of a group of information seekers.

1.1 Research Aims

The aim of this research is to examine information seeking within a collaborative context. The main outcome of this work will be a model or a description of the activity of information seeking as it is performed by a group of information seekers. Specifically, this research aims to:

- Examine the differences between information seeking when performed by an individual and information seeking when performed by a group of information seekers.

- Develop a model of collaborative information seeking based on an analysis of information seeking activities performed by a group of information seekers.

1.2 Relationship to Information Technology

Information technology has been used successful to support many aspects of the information seeking activity. Information technology support for information seeking has ranged from low level text searching and retrieval algorithms through to complete library bibliographic systems, through to emerging areas such as Internet search tools, and the development of digital libraries. The insights provided by research into understanding the information seeking activity, and development of model and theories describing information seeking has influenced the development of information technology to support information seeking (Rouse and Rouse 1984).

As will be shown later in this thesis, collaborative information seeking, that is information seeking as performed by a group of information seekers, has not been examined in detail by previous research into information seeking. As a result, little information technology has emerged to support information seeking when performed by a group. The conceptual understanding of collaborative information seeking provided by the research described in this thesis can be seen as providing the insights and understanding needed to influenced the development of information technology to support collaborative information seeking.

1.3 Research Design

The model of collaborative information seeking described in this thesis was based on an analysis of information seeking activities performed by a group of information seekers involved in a defence capability analysis project, the Command and Control Support (C2S) Study, undertaken by Defence Science and Technology Organisation (DSTO). The Command and Control Support (C2S) Study was a multi-year studied aimed at examining the Australian Defence Force's (ADF) Command and Control capability. As an information seeking activity, the C2S Study was a complex undertaking. It collected

large amounts of complex information from within the ADF, as well as from external agencies. A major component of the C2S Study, was the C2S Study Working Group. The Working Group consisted of ADF and DSTO representatives. The Working Group performed the bulk of information collection and information analysis that formed the C2S Study. The C2S Study Working Group was the group of collaborative information seekers the research described in this thesis examined.

From the C2S Study Working Group, two types of data were collected, minutes from the C2S Study Working Group meetings, as well as semi-structured interviews with Working Group participants. The minutes of the C2S Study Working Group meetings provided an impartial record of the actions and interaction of the Working Group members as they gathered the information needed for the C2S Study. Semi-structured interviews with C2S Study participants were also performed. Semi-structured interviews were used as the data collection method because they provide a technique for gathering very detailed data describing the attitudes, beliefs and reasoning of informants. The interviews were structured via the use of an interview guide (Kvale 1996). These interviews provided a behind the scenes perspective on the actions and interactions that were recorded in the meeting minutes.

Data collection and analysis was guided by the Grounded Theory methodology as described by Strauss and Corbin (1990). Grounded Theory is an approach to qualitative research that provides a set of methods, in the form of a systematic set of procedures, to develop a model or theory about a phenomenon. The method also provides mechanisms to provisionally test the theory as it is developed. In this way, the approach provides for internal validation of the theory, as it is developed (Strauss and Corbin 1990). Grounded Theory is well suited to the study of activities, actions, and of culture (Martin and Turner 1986).

1.4 Thesis Structure

This thesis is divided into seven chapters. Chapter 2 reviews the current literature on information seeking. This review begins by putting information seeking into the context of information literacy. Information literacy describes the skills, abilities and tools that make up an information literate person, that is, a person who is able to gather, use (understand, criticise, absorb) and produce information. Chapter 2 then develops a

conceptual model of information seeking based on the existing information seeking literature. This conceptual model is used to bring together the wide collection of literature describing information seeking into a coherent description of the information seeking activity. This conceptual model describes how and why the information seeking activity begins, the different stages information seekers move through as they seek information, and how and when the information seeking activity ends. Chapter 2 also discusses how information technology has been used to support the information seeking activity.

Chapter 3 examines the information seeking literature describing collaborative information seeking, and develops the concept of collaborative information seeking. Collaborative information seeking can be described in terms of the type of interactions that occur during the various stages of the information seeking activity. These interactions can be seen as a way of differentiating singular information seeking from collaborative information seeking.

Chapter 4 describes the design of the research, and the Grounded Theory methodology. Grounded Theory is a qualitative data collection and analysis methodology suitable for the study of social phenomenon. It was used to guide the collection and analysis of the data. Chapter 4 also describes the study domain. The study domain examined by this research was the C2S Study Working Group.

Chapter 5 describes the application of the Grounded Theory methodology to the study domain. This chapter describes the methods used to collect data from the study domain, and the different data collected. This chapter then describes how the collaborative information seeking model was developed using the Grounded Theory methodology.

Chapter 6 presents the model of collaborative information seeking in detail. The model developed describes collaborative information seeking as consisting of three components. The roles the collaborative information seekers enact. The context in which these actions take place, or from which the collaborative information seekers are drawn. The patterns of interactions between the different collaborative information seekers as they perform the collaborative information seeking activity.

The final chapter, Chapter 7, summarises the work performed, and the limitations of the research undertaken. Chapter 7 also describes the impact this research may have on the area of information technology, as well as describing several potential research areas and interesting research questions this work raises.

2 Information Seeking Literature Review

This chapter reviews the information seeking literature. This chapter begins by putting information seeking into the context of information literacy. Information literacy describes the skills, abilities and tools that make up an information literate person, that is, a person who is able to gather, use (understand, criticise, absorb) and produce information (Bruce 1996; Mutch 1997; Snavely and Cooper 1997).

Following on from the discussion of information literacy, this chapter then develops a conceptual model of information seeking. This conceptual model is used as a way of bring together the wide collection of literature describing information seeking into a coherent description of the activity. This model describes how and why the information seeking activity begins, the different stages information seekers move through as they seek information, and how and when the information seeking activity ends.

The next chapter, Chapter 3, continues this review of information seeking. Chapter 3 reviews the literature describing collaborative information seeking, and develops the concept of collaborative information seeking. Chapter 3 also describes the similarities and differences between information seeking as performed by an individual, and information seeking as performed by a group.

2.1 Information Seeking and Information Literacy

Information literacy is an emerging concept that attempts to encompasses all the skills and tools needed to find, understand, absorb, and essentially *use* information (Bruce 1996; Mutch 1997; Snavely and Cooper 1997). In her seminal work on information literacy, Bruce (1996) describes information literacy as consisting of seven conceptions. Bruce (1996) uses the term conceptions because she is attempting to describe the elements of information literacy as they are "conceived" (Bruce 1996). The seven conceptions of information literacy are illustrated in Figure 1.

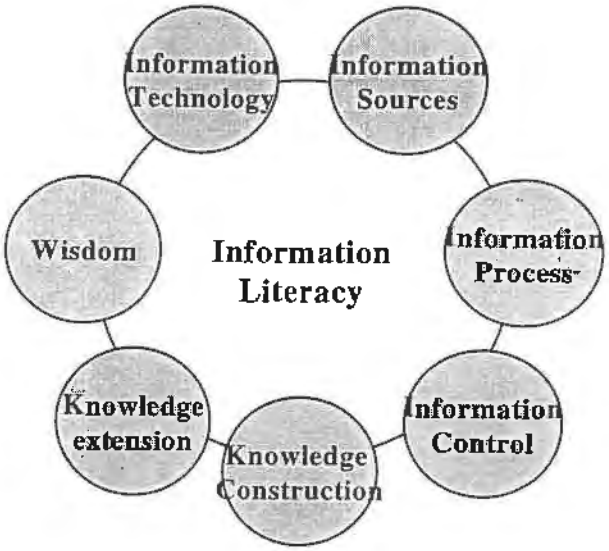

Figure 1. Conceptions of Information Literacy. Adapted from Bruce (1996).

Information Technology. According to Bruce (1996), the information technology conception describes how information technology is used as a part of information literacy. The key role information technology performs is to make information accessible, as well as being a tool for manipulating information once it has been located.

Information Sources. As Bruce (1996) points out, it is knowledge of information sources, and experience with them that makes it possible to gather information from them. This conception then, describes the role of information sources, and the role awareness of information sources has in being information literate.

Information Process. According to Bruce (1996), the information process conception of information literacy describes the information literate person's ability to recognise their need for information, and to make use of the information they can access to meet their need. This conception describes the skills and the idiosyncratic processes information seekers uses to identify and gather information to meet their information need.

Information Control. For Bruce (1996), an information literate person is one who is able to use "various media to bring information within their sphere of influence, so they can retrieve and manipulate it". Bruce (1996) sees the information control conception as describing the information seeker's ability to control information and information sources.

Knowledge Construction. For Bruce (1996), information literacy can be seen as the ability to build a personal knowledge base within a new area of interest. The knowledge construction conception describes the information literate person's ability to use strategies that allow a personal perspective to be applied to the gathered information.

Knowledge Extensions. This conception describes the ability of an information literate person to *create* new knowledge. Building on personal experience and personal knowledge, an information literate person is able to combine new information with already known information, to produce new knowledge, or expand existing knowledge (Bruce 1996).

Wisdom. For Bruce (1996) this final conception, the wisdom conception, describes an information literate person's ability to use information wisely for the benefit of other people. The focus of this conception is not so much on the transformation of information, as in the previous conceptions, but on transformation of information together with the individual's values, attitudes and beliefs, to explicitly benefit other people.

The relationship between information seeking and information literacy is shown in below in Figure 2.

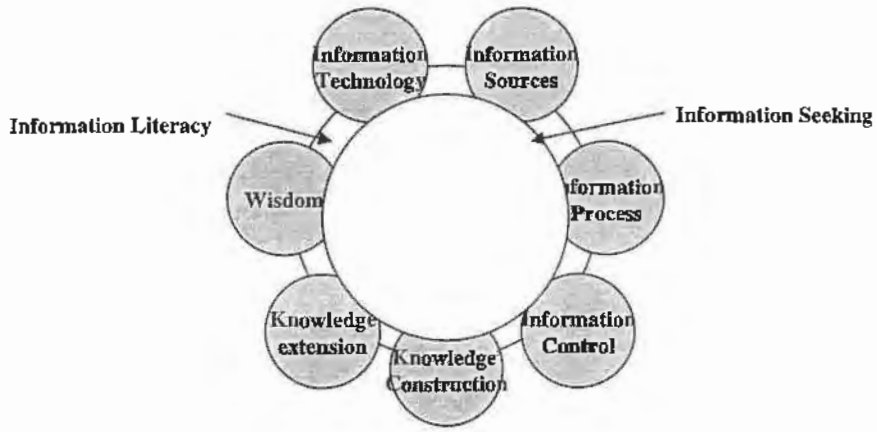

Figure 2. The relationship between Information Literacy and Information seeking

As shown by Figure 2, information seeking can be seen as being an important subset of information literacy. Almost all activities which involves the use of information, involve some type of preceding information seeking activity, or are performed in parallel with some type of information seeking activity (Rouse and Rouse 1984; Brown

1991). The relationship between information literacy and information seeking is a two-way relationship. Not only is information seeking a part of information literacy, but information literacy is a part of information seeking. The skills and abilities ascribed to the information literate are also needed as an information seeker. So to be an effective information seeker, the information seeker must also be information literate.

2.2 Conceptual Model of Information Seeking

Models of information seeking abound. Existing information seeking models range from empirically developed models, through to conceptual models developed from literature studies and reviews. Existing models span many different disciplines, and present information seeking within many different contexts. This section presents a conceptual model of information seeking. This model is not intended as an empirically tested model of information seeking, but rather as a device to bring together the wide collection of literature describing information seeking into a coherent description of the activity.

Existing models of information seeking offer different perspectives on how information seeking can be described, and what activities, steps or actions constitute the information seeking activity. Some authors describe information seeking as a series of steps. Westbrook (1993), for examples, describes information seeking as a sequence of five steps, while Kuhlthau (1991) describes information seeking as consisting of six steps. Other authors see information seeking as a collection of behaviours, for example Ellis (1989), or as an action performed in re-action to situations or events, for example Dervin (1983), Cheuk (1998) and Court (1997). While still other authors see information seeking as a collection of interacting activities, for example Leckie et al. (1996) and Brown (1991).

These different models all carry assumptions about the structure of information seeking. Some models assume information seeking is a linear process, for example, the information seeking models of Vickery and Vickery (1987), Westbrook (1993) and Kuhlthau (1991). Some assume it is a reactive process, for example Dervin's (1983) sense-making model, and Cheuk's (1998) and Court's (1997) information seeking situations. While other authors assume information seeking is a synergistic activity, where the various elements of the information seeking activity interact in parallel, for

example Brown's (1991) synergistic model, and Leckie's et al. (1996) model of information seeking activities of professionals.

In the following sections, a conceptual model of information seeking is described. This model is built from a detailed and broad review of the information seeking literature. This model is intended as a way of bringing together a wide collection of information seeking literature. When seen from a high level, information seeking can be described simply as the activity which moves an information seeker from a state of information need into a state of information satisfaction. This is illustrated in Figure 3.

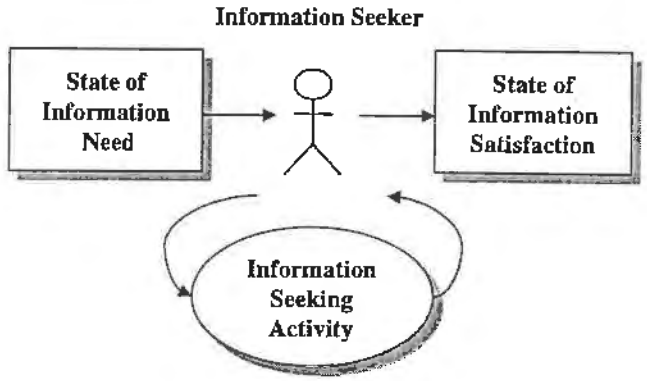

Figure 3. Movement from Information Need to Information Satisfaction.

Information seeking can be seen as being *caused* by entering a state of information need, and *ended* by entering a state of information satisfaction. A mature and well-developed model that describes this is Dervin's Sense-Making model (Dervin 1983; Dervin and Nilan 1986). The sense-making model describes how information seekers move into a state of information need, described by Dervin as a gap in their sense or their understanding or their knowledge of their world. Information seekers can then be seen as performing some type of information seeking activity to fill the gaps in their understanding or knowledge, before moving into a state of information satisfaction where the information seekers are again comfortable with their knowledge of the world.

As shown in Figure 3, the information seeking activity can be seen as moving the information seeker from a state of information need into a state of information satisfaction. Several elements of the information seeking activity emerge out of the literature as being common to all existing models and descriptions of the information seeking activity. These elements are described below.

Understanding Information Need. This activity encoumpasses the activities the information seekers will perform to create an understanding of what information is needed. These information needs can be seen as resulting directly, or indirectly, from the state of information need, the information seekers moves into as a result of external demands or tasks.

Deciding How to Gather. The deciding how to gather activity describes how information seeker's use their awareness and experence with available information sources to select what sources of information would be most likely to satisfy their information needs.

Information Gathering/Retrieval. This activity describes the physical act of gathering information identified as being likely to satisify the information seeker's information needs.

Evaluating Information. This stage of the information seeking activity describes how information seekers evaluate the gathered information against their initial information needs.

These elements of the information seeking activity also seem to be heavily influenced by several factors.

Information Awareness. The selection of information sources will depend on the information seeker's awareness of their existence, and the information seeker's understanding of what information the sources are likely to hold, how useful, how accurate, and how complete the information they hold is likely to be.

Cognitive Abilities. As described above, information seeking involves information processing activities. As will be shown later in this chapter, an individual's cognitive abilities affect their ability to process information, and hence their abilities as an information seeker.

Previous Experience. As shown by several empirical studies (most noticeable Chen and Hernon 1982; Ellis 1989; Kuffner and Ullman 1991; Court 1997), information seekers

will often re-use strategies and experiences of past information seeking activities when faced with similar problems or questions. These past experiences will strongly influence the way an information seeker gathers information.

The relationship between the element of information seeking is shown in Figure 4.

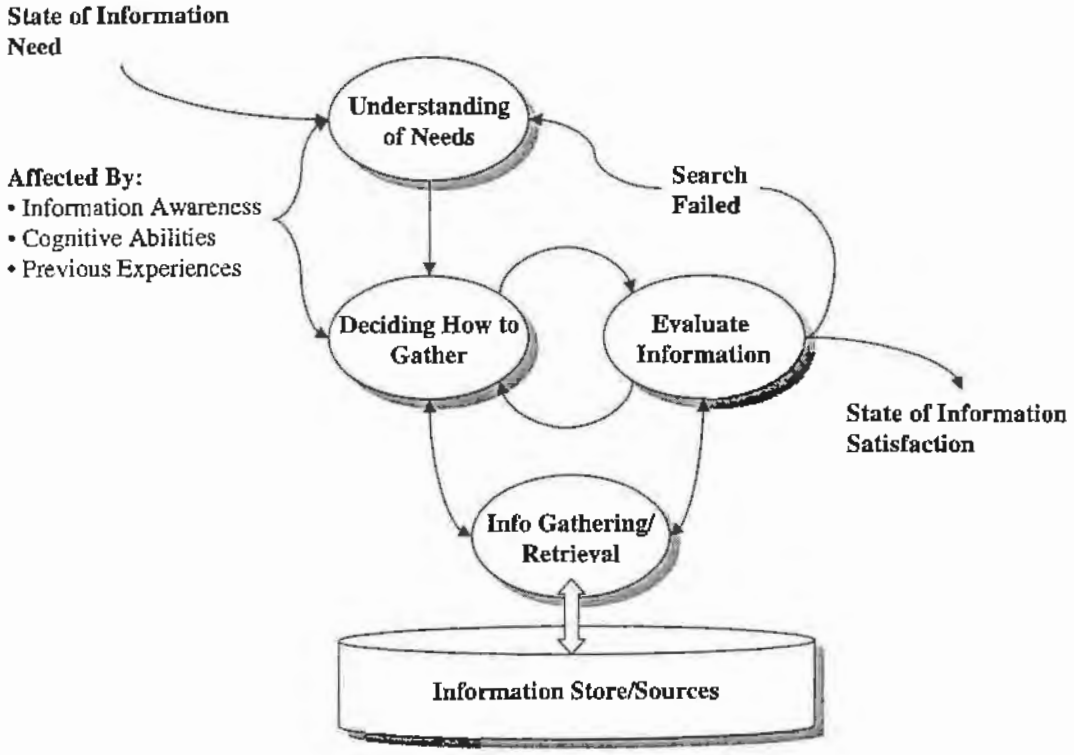

Figure 4. Conceptual Model of Information Seeking.

In general, information seeking can be seen as beginning with an information seeker moving into a state of information need. This state of information need will often be a result of some external task, event, or an information seeking situation. This initial state of information need triggers the information seeking activity.

Once this initial state of information need has been entered, the information seeker moves toward developing an understanding of this information need. Here the information seeker develops an understanding of what the information need is, how it fits with existing knowledge, and how it can be articulated. This stage and the next are both heavily influenced and affected by the information seeker's awareness of potential information sources, the information seeker's cognitive abilities, and previous experiences.

As the information seeker's understanding of their information needs develops, the information seeker moves from the understanding of needs stages of the information seeking activity into the deciding how to gather stage of the information seeking activity. Again, this stage of the information seeking activity is heavily affected by the information seeker's awareness of potential information sources, the information seeker's cognitive abilities, and previous experiences.

Once the information seeker has built an understanding of what information is needed, and how and where it can be gathered, the physical information gathering/retrieval activity begins. Many different strategies are used to gather the information. As the information is gathered, the information seeker also evaluates it. Information evaluation is tightly tied to the information gathering activity, and may even be a physical part of it.

The information seeker may cycle through the gathering-evaluating stage of the information seeking activity many times before being satisfied with the information collected. Once satisfied, the information seeker will move into a state of information satisfaction, and end the information seeking activity. However if no satisfactory information is gathered, then the information seeker may return to the initial understanding of needs stage of the information seeking activity, and re-think the information needs and strategies for satisfying these information needs.

It is important to note that while the above conceptual model of information seeking presents the activity as an ordered set of stages, in reality it is a very dynamic process. Some stages of the information seeking activity may be skipped, combined with others, or performed in a different sequence. At any stage of the activity, the information seeker may abandon the search, or even combine multiple searches together.

2.2.1 State of Information Need

As shown in Figure 4, the state of information need acts as a trigger for the information seeking activity. This section describes the state of information need in detail, and draws together the different literature that discussed it. The state of information need is not so much a process or step, but a state information seekers may find themselves in. This state, which may be the result of an external task, event or situation, triggers the

information seeker to perform some type of information seeking activity to move out of this state of information need.

The information seeking activity can be seen as beginning with some state of information need. This is well represented within the information seeking literature. In her model of information seeking, Westbrook (1993) describes the information seeking activity as beginning with a needing stage. For Westbrook (1993), needing is the state of acknowledging a need for some type of information.

For Kuhlthau (Kuhlthau 1991; Kuhlthau 1993), information seeking begins with an initiation stage. During this stage, the information seeker first becomes aware of the need to gather information. The task during this stage is to recognise the initial need for information. During this step of the information seeking activity, the information seeker's thoughts centre on contemplating the problem, comprehending the task, and relating the problem to previous experiences.

Sutcliffe and Ennis (1998), in their cognitive model of information seeking see the information seeking activity as beginning when the information seeker encounters an "external task information problem" (Sutcliffe and Ennis 1998). For Sutcliffe and Ennis (1998), this is an external task, which the information seeker needs additional information to solve.

As discussed previously, the state of information need draws heavily on Dervin's Sense-Making model (Dervin 1983; Dervin and Nilan 1986). The sense-making model describes how an information seeker moves into a state of information need, described by Dervin as a gap in the information seeker's sense. Once information seekers sense a gap, they perform some type of information seeking activity to fill the gap, before moving into a state of information satisfaction where the information seeker is again comfortable with their knowledge of their world.

While the sense-making model helps to describe the state of information need, it doesn't describe the situations that cause this information need. Work by Cheuk (1998) and Leckie, et al. (1996) can be used to describe what situations might cause a state of information need.

Cheuk (1998) examined the information seeking needs and information seeking behaviours of quality engineers (engineers involved in the quality control process of a large electronics manufacturing organisation). She found that much of the information seeking activities performed by the engineers was a result of information seeking situations. Information seeking situations can be described as an archetypal problems or group of problems, which the engineers encounter in their work. She found that the engineers she examined tended to develop patterns of information seeking behaviours as a result of past information seeking situations, and tended to re-use these patterns in similar information seeking situations.

A related, but more comprehensive view was developed by Leckie, et al. (1996). In examining the information seeking needs and uses of professionals (specifically, doctors, lawyers and engineers), they found that there was a tight relationship between the professional's work role, the tasks that role included, and the type of information needed. Leckie, et al. (1996) describes professionals as adopting one of five professional roles; service provider, administrator/manager, researcher, educator, and student. Each professional role, they argue, has it own specific information seeking needs. So when adopting any one of these roles, professionals as information seekers, find themselves with a different set of information situations resulting in different sets of information seeking needs.

2.2.2 Understanding Information Need

Once an information seeker has moves into a state of information need the first stage of the information seeking activity is the understanding information need stage. This stage of the information seeking activity moves the information seeker from the initial state of information need, triggered by an external task or situation, to being able to select and query specific information sources.

This stage of the information seeking activity has been identified and defined by several authors. Westbrook's (1993) starting stage describes the point at which the information seeker moves from having an information need to being able to deciding how best to meet that need. She points out that the process of moving from acknowledging a need to developing ways of articulating it is often ill defined within the literature (Westbrook 1993).

As discussed in the previous section, Kuhlthau's initiation stage describes how the information seeker first becomes aware of the need to gather information, and how the information seeker builds an understanding of the problem and relates it to previous information seeking experiences (Kuhlthau 1991; Kuhlthau 1993). Kuhlthau's second information seeking stage, the selection stage, describes how an information seeker identifies and selects a topic to be investigated, or the approach to be used. During this step, feelings[1] of uncertainty before the selection is made moves to feelings of optimism after the selection has been made. The information seeker's thoughts often centre on evaluating possible topics or approaches to find the best possible topic or approach. The information seeker's actions will often involve discussing options with others, and possibly conducting preliminary information searches. If selection is postponed or delayed for whatever reason, feelings of anxiety are likely until the choice is made (Kuhlthau 1991; Kuhlthau 1993). Combined, the initiation and selection stages of Kuhlthau's information seeking model describe the activities performed while the information seekers build an understanding of their information needs.

Brown (1991) describes the information seeking activity as beginning with a perceived need and moving through activities which work to satisfy that need. The information seeking activity ends when the need is satisfied. Once the initial information need has been identified, the information seeker moves to recognise and develop ways to express the information need, and then moves toward satisfying that need.

Sutcliffe and Ennis's (1998) two stages, identify problem and articulate needs encompass the activities described here as being important for building an understanding of an information need. For Sutcliffe and Ennis (1998) the problem identification stage of the information seeking activity involves identifying the initial goals or information needs. Once the problem has been identified, Sutcliffe and Ennis (1998) describe the information seeker, as moving into the articulation of needs stage of the information seeking activity. During this stage of the information seeking activity, the information seeker articulates the information needs identified in the previous step.

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[1] Kuhlthaus's model of singular information seeking (especially Kuhlthaus 1991 and Kuhlthaus 1993) explores the information seeker's feels in more detail.

Belkin's (1980) anomalous state of knowledge (ASK) model describes many of the properties of information needs, and how they can be understood and articulated by the information seeker. Within the ASK model, information seeking needs can be seen as existing on two dimensions, the cognitive and the linguistic dimension. Figure 5 below shows the relationship between the cognitive and linguistic dimensions of information seeking (Belkin 1980; Belkin, et al. 1982a; Belkin, et al. 1982b).

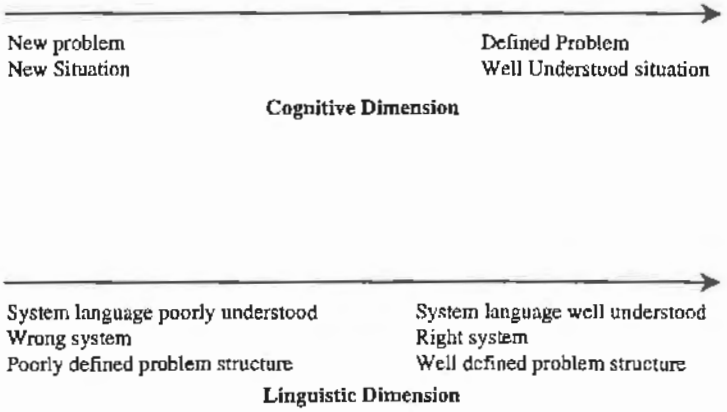

Figure 5. ASK Cognitive and Linguistic Dimensions. Adapted from Belkin (1980).

For Belkin (1980), the cognitive dimension describes how well the information seeker understands the information need. At the left of the cognitive dimension are the information needs, which are poorly understood by the information seeker, and are difficult for the information seeker to express. At the right end of the dimension are the information needs, which are well understood by the information seeker, and can be clearly described.

The linguistic dimension describes how well the information seeker can articulate the information needs. At one end of this dimension exists information needs which cannot be articulated well by the information seeker. These might be difficult to articulate because they exist at the left end of the cognitive dimension, that is they are poorly understood by the information seeker. Alternatively, the information seeker may be trying to express them in an inappropriate language, or in an inappropriate manner. At the other end of this dimension exists information needs that are easy for the information seeker to articulate. They are generally well understood information seeking needs (that is they exist at the right end of the cognitive dimension), or they are being articulated in the right language, or in an appropriate manner.

As an information seeker moves from the initial state of information need through to being able to select and query information sources, their information needs will move along these two dimensions. As Belkin points out, information needs that don't move toward the right of both the cognitive and linguistic dimensions, (that is become well understood by the information seeker, and be well articulated by the information seeker) stand little chance of resulting in gathering information that the information seeker actually needs or can use (Belkin 1980; Belkin, et al. 1982a; Belkin, et al. 1982b).

As shown in Figure 4, this stage of the information seeking activity, and the next stage of the information seeking activity the deciding how to gather stage, are both affected and influenced by several factors. These factors are information awareness, the information seeker's cognitive abilities, and the information seeker's previous experiences.

Information awareness describes the information seeker's knowledge of accessible information sources as well as their properties. Information awareness has an affect on how well the information seeker can move from the initial state of an information need, to being able to decide how to gather the needed information.

One of the factors that Belkin (1980) sees as being important in being able to articulate an information need, is the use of the right language. As a more detailed understanding of information need is built by the information seeker, the information seeker begins to find ways of articulating the information need. As Belkin (1980) points out, the language used to articulate the information needs comes from the information sources that will be used to gather the needed information. So, an awareness of what information sources are available will affect how well the information seekers are able to articulate their information needs (Belkin 1980; Belkin, et al. 1982a; Belkin, et al. 1982b).

The information seeker's cognitive abilities also affect this stage of the information seeking activity. At this stage in the information seeking activity, the information seeker is concerned with ways of identifying and articulating information needs. This is a very cognitive and idiosyncratic stage of the information seeking activity. And it is affected by the information seeker's cognitive factors, such as problem-solving skills, need

awareness, need expression abilities, memory, language skills, as well as the information seeker's demographic variables (education, age, occupation, stage in career) (Chnag 1989; Gralewska-Vickery 1976).

A major influence on the information seeking activities are the information seeking personalities described by Palmer (1991) and Bonner, et al. (1998). While their resulting models differ, the goal of both is the same, to describe the general attitudes toward information seeking that information seekers have. As with other personality, behavioural or attitude generalisations, these models attempt to describe the general attitudes an information seeker has toward gathering and storing information, and the types of activities they may used. The resulting models can be seen as describing the information seeker's information seeking personality, a set of behaviours, attitudes, and beliefs that the information seeker has toward information and information seeking. These underlying information seeking personalities affect how the information seeker seeks information.

The information seeker's previous information seeking experiences will also have an affect on this stage of the information seeking activity (Chnag 1989). Empirical studies of information seekers Gralewska-Vickery (1976), Cheuk (1998), Bichteler and Ward (1989) and Court (1997) have shown that information seekers tend to re-use past information seeking strategies when faced with states of information need that are perceived as being similar to ones experienced in the past. These past experiences are used as the basis for developing new strategies if the state of information need is sufficiently different, or they are re-used as complete strategies, if the state of information need is sufficiently similar.

The next stage of the information seeking activity, deciding how to gather, describes how the information seekers moves from the detailed understanding of their information needs to being able to gather the information they need.

2.2.3 Deciding How to Gather

This stage of the information seeking activity, the deciding how to gather stage describes how the information seeker moves from having a set of information needs to physically gathering the needed information. This stage includes many strategies and

techniques the information seeker uses to find and evaluate information and information sources.

This stage of the information seeking activity is well represented within the literature. In her description of her working stage, Westbrook (1993) describes many of the activities that are a part of the deciding how to gather stage of the information seeking activity. Westbrook (1993) describes this stage of the information seeking activity as the most complex part of the process, encompassing all the activities and functions performed to gain or gather the needed information.

The exploration and formulation stages of Kuhlthau's empirically grounded model of information seeking, captures many of the elements of the deciding how to gather stage described here. During the exploration stage, Kuhlthau describes the information seeker as developing an understanding of the search domain, and starting to relate the new information gathered to information already known. The exploration stage is characterised by feelings of confusion, uncertainty and doubt. Gathered information may not fit smoothly with already known information, and this may cause the information seeker to feel discouraged and threatened. Many information seekers may abandon the information search at this point. During the formulation stage of the information seeking activity, Kuhlthau describes the information seeker as developing a focus for the search and developing strategies for gathering information. During the formulation stage of the information seeking activity feelings of uncertainty decrease and feelings of confidence increase (Kuhlthau 1991; Kuhlthau 1993).

Most of the information seeking behaviours described in Ellis's behavioural model (Ellis 1989; Ellis, Cox et al. 1993; Ellis and Haugan 1997) describe activities information seekers perform during the deciding how to gather stage of the information seeking model.

The Starting or Surveying behaviour describes how the information seeker obtains an overview of the initial area to be searched. The goal of this behaviour is to obtain an overview of the field, and to build a mental model of what work exists, how it is described and how it can be accessed. For an information seeker deciding how to gather information, the starting or surveying behaviour describes one of the first activities

information seekers will perform as they move from the deciding how to gather stage to gathering the needed information.

Ellis's chaining behaviour describes the process of following citation connections between information sources. This is often seen when following up the relevant citations given in an academic paper, or through personal contacts or colleagues. The chaining activity will often stop when the references being found start to move away from the original topic or once no new references are being found, or when time begins to run out (Ellis 1989; Ellis and Haugan 1997). As the information seeker move through the deciding how to gather stage of the information seeking activity, chaining becomes more important, as potential sources, and potential search methods are selected.

As shown previously in Figure 4 the deciding how to gather stage of the information seeking activity is affected by several factors, including the information seeker's awareness of available information sources, the information seeker's cognitive abilities and the information seeker's previous experiences. Of the various factors that may affect the information seeker during this stage of the information seeking activity, the information seeker's awareness of available information sources has the most noticeable affect.

Ellis describes information seekers as building and maintaining an awareness of available information sources in several ways. Monitoring behaviour describes how information seekers maintain an awareness of developments and technologies in a specific field. Both formal and informal methods are used. Formal methods often include journals, conference proceedings, and alert/monitoring services. Informal methods often include personal contacts, popular press, publishers' catalogues, and the like. A related approach Ellis describes as being important to information awareness is *browsing*. Browsing is often the most visible form of the monitoring activity. Browsing is often used to maintain an awareness of developments, as well as gaining an overview of a new area (Ellis 1989; Ellis, Cox et al. 1993; Ellis and Haugan 1997).

Also important to maintaining an awareness of information sources, and finding new sources of information is the accidental discovery of information. Accidental information discovery describes the chance discovery of information that the information seeker was not specifically seeking, but found useful after its discovery.

In a recent review of the literature on accidental information discovery, Erdelez (1997) noted that accidental information discovery has generally been seen in two distinct models, browsing behaviours, and environmental scanning. Browsing generally describes what Erdelez calls the "don't-know-what-I-want-behaviour". It can be seen as a semi-directed or semi-structured form of information seeking where the information seeker will scan a collection of information sources, with no particular information seeking goal in mind. The second model of accidental information discovery is environmental scanning. Environmental scanning can be seen as a type of information acquisition that involves various information activities needed to keep abreast of new information, changes or developments in specific domains (Erdelez 1997).

As Erdelez (1997) points out, accidental information discovery is important to information seeking because it represents a major way for information seekers to find information within complex environments, and it also represents a major way for information seekers to maintain an awareness of potentially useful information sources.

As discussed previously, the information seeker's previous information seeking experiences can have an impact on several stages of the information seeking activity, including this stage. As shown by several empirical studies of information seeking, information seekers often re-use strategies and techniques used to gather similar information (Gralewska-Vickery 1976; Bichteler and Ward 1989; Court 1997; Cheuk 1998). When deciding what information sources to use, the information seeker's past experiences with the information source will often have a major affect on whether it is used, and if it is used, how it is used. Other factors such as the perceived quality, accuracy and timeliness of the information source will also affect its use (Gralewska-Vickery 1976; Bichteler and Ward 1989).

Ellis grouped the decisions and judgements made by the information seeker about information sources into his Differentiating (or Distinguishing) behaviour. Differentiating describes the process of filtering or ranking material based on the perceived differences (in terms of quality, orientation, timeliness, and so on) of the source. Differentiating will often affect the placement of a particular source in the information seeker's model of relevant information sources. This is often seen when seeking, browsing or monitoring activities takes place. Sources perceived as being of

poor quality, or not directly related to the area of interests are often not utilised, or are utilised last (Ellis 1989; Ellis and Haugan 1997).

As well as perceptions of quality, timeliness and relevance, the information seeker's personal preference also affects what information sources the information seeker would consider using. As Krikelas (1983) points out, individual information seekers have their own personal hierarchy of the types of information sources they prefer. Some information seekers prefer impersonal sources, such as books, journals, and the like, rather then personal information sources such as other people. Other information seekers have the opposite hierarchy; preferring personal information sources rather then impersonal sources.

After deciding how the information to satisfy the identified needs will be gathered, the information seeker moves into the next stage of the information seeking activity, the information gathering/retrieval stage. This information seeking stage is the subject of the next section.

2.2.4 Information Gathering/Retrieval

This stage of the information seeking activity describes how the information seeker physically gathers the needed information. The actions performed in this stage of the information seeking activity draw on the work the information seeker has performed in the previous two information seeking stages. This information seeking stage is well represented within the information seeking literature, and forms a part of almost all conceptual and empirical models of information seeking.

For Westbrook (1993) physically gathering or retrieving information forms a major part of her working stage. This stage describes all the activities the information seeker performs to gather the information identified as being important as a result of the previous stages of her information seeking model.

Kuhlthau's collection step of the information seeking activity describes the process of actually gathering the information selected. By this stage of the information seeking activity, Kuhlthau describes the information seeker as having developed a clearer sense of what topic is being searched, and what information is needed. However, Kuhlthau's

description of collection is undefined. She seems to assume that information is collected using traditional library tools; indexes, abstracts, and bibliographies, on traditional information sources; books, journals, newspapers, conference proceedings, and similar sources (Kuhlthau 1991; Kuhlthau 1993).

As pointed out by (Vickery and Vickery 1987) when physically gathering the needed information, the information seeker can employ a wide selection of well understood tools and strategies to gather the needed information. Library bibliographic systems, journal abstracts, publisher's catalogues, organisational archives, for example, are standard methods for gathering traditional information sources. Personal contacts, professional contacts or other organisational or institutional members also represent a frequently consulted information source. As with other information sources, issues of trust, reliability, availability, and awareness, all affect the use of people as an information source, as they do more traditional information sources (Johnson 1996).

Once the information seeker has gathered the needed information, the information seeker will move into the final stage of the information seeking activity the evaluating information stage. This information seeking stage is described in the next section.

2.2.5 Evaluating Information

The goal of the evaluating information stage of the information seeking activity is for information seekers to evaluate the selected and gathered information against their initial information needs. During this stage of the information seeking activity, information seekers decide if they have gathered enough of the right information to move out of the state of information need, and into a state of information seeking satisfaction. As shown in Figure 4, this information seeking stage includes a link back to the start of the information seeking activity. If information seekers find that the information they have gathered fails to meet their initial information needs, they may move through the information seeking activity again.

Not all information seeking models include an evaluating stage. For Westbrook (1993), evaluating the information selected is part of her working stage. This stage combines many of the activities and functions performed to gain or gather the needed information,

including selecting information sources, physically gathering the needed information, and evaluating the selected information.

For Kuhlthau's, evaluating the gathered information forms part of her collection step. During this step of the information seeking activity, the process of actually, gathering and evaluating the information is performed (Kuhlthau 1991).

Leckie, et al. (1996) see the evaluation of gathered information as part of their outcomes stage. For them, the outcome is the end of the information seeking activity that combines the evaluation of gathered information with the satisfaction of the information seeker's initial information needs. In their outcome stage, Leckie, et al. (1996) see the information seekers simultaneously gathering and evaluating the information.

Within her sense-making model, Dervin (1983) describes the evaluation of gathered information as tightly tied to the use that the information will be put to, rather then the initial information need. The sense-making model focuses on how information seeker's construct meaning within the information they gather, and as such, does not assume a mechanistic connection between information gathered and use. Within this model, information is not so much evaluated against a set of information needs, but is evaluated contextually, against the sense-making situations information seekers find themself in. Empirical studies of the sense-making model have used the positive and negative affect on the information seeking situation (referred to as the helps and hurts), as a way of evaluating the gathered information (Dervin 1983).

Positive affects of the gathered information, the helps, generally describe how the gathered information moves the information seeker over the sense-making gap. The negative affects of the gathered information, the hurts, are seen as preventing the information seeker from moving over the sense-making gap. They may prevent information seekers from moving over the sense-making gap because it didn't solve or help solve the information seeking situation the information seekers found themself in (Dervin 1983; Dervin and Nilan 1986).

If the information identified and gathered by previous information seeking stages and evaluated within this information seeking stage satisfy the information needs the information seeker has, the information seeker moves into the final part of the

information seeking activity, the state of information satisfaction. The state of information satisfaction is described in the next section.

2.2.6 State of Information Satisfaction

As discussed previously, Dervin's (1983) sense-making model describes how an information seeker moves into a state of information need, performs information seeking activities to meet that need, before moving into a state of information satisfaction. This is represented graphically in Figure 3. This final stage of the information seeking activity, the state of information satisfaction, captures this. The state of information satisfaction is almost the reverse of the state of information need. When in a state of information need, information seekers are unsatisfied with their state of personal knowledge; when in the state of information satisfaction, information seekers are satisfied with their state of personal knowledge. The information seeking activity typically ends when information seekers enter this state (Dervin 1983; Dervin and Nilan 1986).

Different authors have described the ending of the information seeking activity in a variety of ways. In their model of the information seeking activities of professionals, Leckie, et al. (1996) describes the information seeking activity as having an *outcomes* stage. Once in this stage, Leckie, et al. (1996) describe information seekers as having satisfied their information seeking needs, that is, entering a state of information satisfaction.

As well as moving information seekers into a state where they are satisfied with their levels of knowledge about their world, some authors ascribe other ending activities and actions to the closing of the information seeking activity. Westbrook (1993) describes a distinct closing stage as part of her description of information seeking. The closing stage collects the activities that are performed at the end of the information seeking activity. These activities may be formal activities, for example writing up and presenting the results of the information seeking activity. Or, these activities may be informal, with the information seeker wrapping up the information seeking experience in some way, perhaps sharing what they have found, or organising and storing the information gathered.

For Kuhlthau (1991), the information seeking activity ends with a formal presentation stage. During this stage of the information seeking process, the task of the information seeker is to complete the information seeking activity and to present, or in other ways use, the findings of the information seeking activity. During this stage of the information seeking activity, feelings of satisfaction or dissatisfaction are common. Thoughts often involve a synthesis of new information, with information already known (Kuhlthau 1991; Kuhlthau 1993).

Ellis describes the information seeking activity ending with a specific ending behaviour. This behaviour generally includes the activities carried out at the end of the project (rather than at the end of a specific information seeking activity). For most of the information seekers examined in Ellis, et al. (1993) and Ellis and Haugan (1997) the end of a project involves a write up of results and findings.

2.3 Information Technology and Information Seeking

Information technology has been use to support some of the stages of the information seeking activity described in this chapter. Both the understanding information needs and the deciding how to gather stages of the information seeking activity have been indirectly supported by information technology. As discussed previously, during the understanding information needs stage of the information seeking activity, the information seeker develops an understanding of what information is needed, and how the needed information fits with already known information. During the deciding how to gather stage of the information seeking activity, the information seeker selects the information sources that will be used, as well as methods for accessing them. The information seeker's selection of information sources is affected by their awareness of the information source, and their experience with it.

As Kuhlthau points out, during the understanding information needs stage of the information seeker activity, the information seeker may conduct preliminary searchers to help again a better understanding of the needed information (Kuhlthau 1991; Kuhlthau 1993). Information retrieval tools, which allow the information seeker to browse a specific topic, or show the relationships between different keywords, allow the information seeker to again a more detailed understanding of the topic. Browsing also allows the information seeker to begin to build an understanding of what language to

use to find information to satisfy the initial information need. As Belkin (1980) points out, the ability of the information seekers to not only understand the information seeking topic, but to express it in the most appropriate language is vital for the success of the information seeking activity.

The information gathering/retrieval stage of the information seeking activity has been well supported by information technology. As described in this chapter, during the information gathering/retrieval stage of the information seeking activity, the information seekers physically gather the information identified as being likely to satisfy the information seeking need. Information technology exists to provide information seekers with powerful tools to locate the needed information. Examples of this technology include Internet search tools, and library bibliographic systems. Systems also exist to not only provide pointers to the needed information, but also physically gather the needed information. Full text retrieval systems, for example, the Gale Group's ComputerSelect system, not only provide pointers to needed information, but also will also physically retrieve the needed information.

As described previously, the final stage of the information seeking activity is the evaluating information stage. During this stage of the information seeking activity, information seekers evaluate the gathered information against their initial information seeking need. Little technological support is available for this stage of the information seeking activity.

2.4 Summary

This review of the information seeking literature began by examining information seeking in terms of the broader context of information literacy. Information literacy can be described as encompassing the skills and tools needed to *use* information in some way. The relationship between information literacy and information seeking is two-way. Information literacy depends on the ability to affectively seek information, and the ability to seek information depends on being able to use it, that is, being information literate.

This chapter then presented a conceptual model of information seeking. The model was used to combine the wide information seeking literature into a coherent description of

the activity. This conceptual model of information seeking is illustrated in Figure 4, and it consists of the following elements:

- State of Information Need
- Understanding Information Need
- Deciding How to Gather
- Information Gathering/Retrieval
- Evaluating Information
- State of Information Satisfaction

The information seeking activity can also be seen as being affected by several factors, namely:

- Information Awareness
- Cognitive Abilities
- Previous Experience

This chapter also describes how information technology has been used to support the information seeking activity. Of the four information seeking stages, only the information gathering/retrieval stage of the information seeking activity has been fully supported by information technology. With the understanding information needs and the deciding how to gather stages of the information seeking activity being indirectly supported by information technology.

The next chapter, Chapter 3 continues the discussion of information seeking. Chapter 3 specifically examines information seeking within a collaborative context. The literature describing information seeking within a collaborative context, as well as other relevant literature is reviewed, and the differences between singular information seeking and collaborative information seeking are discussed.

3 Collaborative Information Seeking

Continuing on from the review of information seeking presented in Chapter 2, this chapter reviews the literature describing collaborative information seeking, and builds a conceptual bases for collaborative information seeking. Using the conceptual model of information seeking developed in Chapter 2, this chapter describes how collaborative information seeking differs from singular information seeking.

As shown by the conceptual model of information seeking developed in Chapter 2, information seeking is not a simple mechanical process. It is affected and influenced by the information seeker's cognitive abilities, awareness and experiences with the information sources, and the information seeker's past information seeking experiences. Thus, the nature of the information seeking activity is shaped by the nature of the information seeker. The main argument this thesis makes is that information seeking performed by a group, that is collaborative information seeking, is different from information seeking performed by an individual working alone, because the group, as an information seeker, alters and affects the information seeking activity.

While some authors, noticeably Narayanan, et al. (1999), acknowledge that group or collaborative information seeking is different to individual or singular information seeking, a review of the information seeking literature shows that little research has been devoted to examining the difference between group and individual information seeking.

3.1 Interactions within Information Seeking

As shown by the literature review of information seeking, information seeking can be viewed and described in many different ways. It can be examined from a conceptual perspective, it can be examined in terms of its context, and it can be examined in terms of the information gathered, or the sources used. This section re-examines information seeking from the perspective of the type of interactions that occur during the information seeking activity.

No Interactions. Research by Court (Court, et al. 1995a; Court, et al. 1995b; Court 1997) has shown that information seeking can involve no interactions when information seekers retrieve information from their memory. In this case, the information seeker is completely self contained and has no interactions with external agents or systems.

A Client -- Service/Service provider interaction. This is a very common form of information seeking interactions. Generally, it involves the information seeker articulating a set of information needs, or a well developed information retrieval query to some type of external agent. In many cases, the agent may be a service provider in the form of a librarian or other information professional. The information seeker, for example, might ask a librarian to find information on a topic, or present a librarian with a collection of information needs, and ask for any information that may satisfy them (Vickery and Vickery 1987; Kuhlthau 1993; Lancaster and Warner 1993). Alternatively, the agent may be an information system, in the form of a database, or an index service, or bibliographic system, or similar system. In this case, information seekers articulate their information seeking query to the system for retrieval (Belkin 1980).

A Group/Collaborative interaction. This form of information seeking seems to exist within a group of information seekers. Within this type of information seeking, the actual information seeking situation and the development of information needs is performed by a group. Evidence of this type of activity is presented in Chapter 6, where a model of collaborative information seeking is developed.

The different types of information seeking interactions can be represented on a continuum, ranging from no interactions through to group/collaborative interactions. This is illustrated in Figure 6.

Figure 6. The Singular-Distributed-Collaborative Information Seeking Continuum.

In Figure 6, the singular point on the continuum describes the case of no interaction, the distributed point describes the case of client -- service/service provider interactions, and

the collaborative point describes the case of group/collaborative interactions. The factor that defines where on this continuum the information seeking activity exists is involvement of other people within the different stages of the information seeking activity.

Singular information seeking, at the extreme left of this continuum, describes information seeking that is performed completely by one information seeker. Singular information seeking will generally involve information seekers retrieving information from their memory. No external agents or systems will be involved as information seekers move into a state of information need, identify their information needs, retrieves the information from their memory, and move into a state of information satisfaction.

As the information seeking activity moves along the continuum toward distributed information seeking, the information seeking activity begins to involve more agents or systems during the physical gathering of information, and the development of strategies to gather information.

Fully distributed information seeking, the middle of the continuum in Figure 6, describes information seeking that will involve external agents or systems during the deciding how to gather and the information gathering/retrieval stages of the information seeking activity. In distributed information seeking, individual information seekers are still responsible for their initial movement into a state of information need and the articulation of their information needs. The information seeker may assign the selection of information sources and the physical information gathering to an external agent or system. However, the evaluating information stage and the decision to end or continue the information seeking activity is still performed by the individual information seeker.

An information seeker asking a librarian to gather information on a specific topic is an example of distributed information seeking. In this case, information seekers find themselves in a state of information need. They identify their information needs, and describe them to a librarian. Using the information seeker's needs as a guide the librarian then decides what sources would be the most applicable, and gathers likely information. The gathered information is then passed back to the information seekers, who evaluates it against their initial information needs and decide if enough of the right

information has been collected to end the gathering activity, or if they need to re-examine their information needs and re-start the information seeking activity.

As the information seeking activity moves from being a distributed activity to being a collaborative activity (the extreme right of Figure 6) the involvement of external agents or systems in the understanding of needs and the evaluation of information stages of the information seeking activity begins to increase. As the information seeking activity moves further to the right of the continuum, more then one information seeker will be involved in the movement into the state of information need and the movement into a state of information satisfaction. Fully collaborative information seeking, (the extreme right of Figure 6), is a group activity. Fully collaborative information seeking involves multiple information seekers at all stages of the information seeking activity, from the initial movement into a state of information need, through the various information seeking activities, and the movement into the state of information satisfaction.

3.2 Groups and Group Work

As described above, collaborative information seeking can be seen as a group activity. Collaborative information seeking involves information seekers collaborating during all stages of the information seeking activity. Collaborative information seeking is affected by the nature of the group and of the group's interactions. While issues such as Group Think, and politics within groups has an affect on the function of groups, this section describes the structure of groups, and how group membership and responsibilities within groups are formed.

In their detailed review of the literature describing groups, Wood, et al. (1992) derive four key groups properties, specifically:

- Group can only be understood as a whole
- Groups are synergistic
- Group members interact dynamically and constantly
- Groups exist in a greater environmental context

Each of these group properties is describe in detail below.

The first property of a group is that any part of a group can only be understood within the context of the whole group. Groups are tightly woven entities, where any one part of the group cannot be understood outside of the context of the group. The group norms, the power structure, leadership, and other group factors, for example, tightly influence an individual's actions within a group. Examining the individual's actions outside this context will lead to a distorted view of their actions (Wood, et al. 1992).

The second property Wood, et al. (1992) assign to groups, is that a group is more than the sum of its parts, that is, groups are synergistic. The products or decisions or actions performed by a group equate to more then could be produced by the same individuals working alone. Hartley (1997) uses the term *groupness* to describe the synergistic property of groups, and the personality of the group as an entity.

The third property of groups is that that all members of a group interact dynamically and constantly. Each part of a group, its membership, its setting, and its organisational context all affect the other parts of a group. In this way all, the elements of a group are interwoven with all the other parts of a group. Changes in one part affect all the interconnected parts of the group (Wood, et al. 1992).

The forth and final property of groups described by Wood, et al. (1992) is that a group exits within a greater environmental context, and can only really be understood within that context. Just as the elements of a group are tightly woven together, so is the group bound with the environmental context in which it exists.

Within groups, individuals are assigned and assume roles. Individuals may be assigned or may assume more then one role. Roles can be formally assigned by the group, influential group members or by people external to the group, or roles may also be assumed by group members through tacit or explicit negotiation within the group (Shaw 1981).

Roles pull together behaviours, actions and responsibilities that group members have and perform. The different roles group members have affects the parts they play within the group, and the group processes. Roles can be further refined into perceived, expected and enacted roles. A perceived role is the set of behaviours and responsibilities the group members feel they should perform or enact. The expected role is the set of

behaviours and responsibilities other group members expect the individual to perform. The enacted role is the set of behaviours and responsibilities the group member actually performs. A mismatch between the perceived, expected and enacted role can lead to role ambiguity, where individuals are unsure of what is expected of them (Shaw 1981).

The theory of structuration describes how group roles and structures are formed and re-formed by group members through the use of social rules and resources. Social rules describe what is considered accepted/unaccepted, good/bad, or what should be done/not done, within a group. Social rules define and describe behaviour within the group. Resources describe materials, possessions or attributes that can be used to influence or control the actions of the group, for example an expert's knowledge, or skills. Through the enforcement or non-enforcement of social rules, and the distribution, or withholding of resources, group members can, often tacitly, affect the actions and interaction of other group members. Group members can influence the groups' perception of their role by showing expertise in an area, or consistently volunteering to perform related activities (Poole 1992).

Communications within groups is vital and an almost constant activity. Groups form, develop and work as a result of inter-group and intra-group communication. Within groups (and most human interactions) communication is used to help build relationships within the group and between group members. Relationships, empathy and understanding develop through communication (McCroskey and Richmond 1992). One of the essential problems of inter-group communication is the mutual knowledge problem (Krauss and Fussell 1990). For group members to communicate effectively, they must develop some idea of what the person(s) they are communicating with knows and doesn't know in order to build an understanding of what they have to say to them. This understanding is often built through communication.

3.3 Groups and Information Seeking

As shown previously, information seeking is described as a collection of stages information seekers progress through as they attempt to move from a state of information need into a state of information satisfaction. The stages of the information seeking activity are illustrated in Figure 4, and discussed in detail in Chapter 2. This

section describes some of the ways groups and the nature of group work affects the various stages of the information seeking activity.

State of Information Need. The initial state of information need triggers the information seeking activity. The information seeker will move into this stage as the result of some external situation or task. At this stage of the information seeking activity the group, as an entity will move into the state of information need. As discussed previously, groups can be described as synergistic, as having a personality, and having or not having knowledge as a group. As with individual information seekers, the group, as the information seeker may find itself moving into the state of information need because of an external situation or external task. Once in a state of information need, the group moves into the first stage of the information seeking activity, understanding information needs, described below.

Understanding Information Need. This stage of the information seeking activity captures all the activities needed for the group to create an understanding of what information it needs to gather. Through negotiation and discussion the group members collaboratively build an shared understanding of what information the group needs to move out of the state of information need the group currently finds itself in.
Each group member brings a different set of experiences and knowledge to the group processes. When shared with the group, these help form a collective understanding of what needs to be known by the group.

Deciding How to Gather. The deciding how to gather stage of information seeking activity describes how information seekers use their awareness and experience with available information sources to select what sources of information would be most likely to satisfy their information needs. Here the group is likely to rely on the expertise and experiences group members have with information sources, as well as the previous information seeking experiences the group, as an entity, has had.

Information Gathering/Retrieval. This activity describes the physical act of gathering information identified as being likely to satisify the groups' information needs. This stage of the information seeking activity may be performed by specific group members in parallel, or by several group members working together.

Evaluating Information. During this final phase of the information seeking activity information seekers evaluating the information gathered against their information seeking needs. Evaluating the gathered information is a group activity. Gathered information is compared to the initial information needs. If the gathered information is found to satisfy the groups' information needs, the group as, an entity, will move into a state of information satisfaction, and the information seeking activity will end. However, if the gathered information dosent satisfy the groups' information needs, the group may cycle through the information seeking activity again.

State of Information Satisfaction. If the group finds the information gathered satisfies its information needs, then the group will move into a state of information satisfaction. A state of information satisfaction means the group has enough information to continue with its tasks.

3.4 Summary

This chapter has examined the concept of collaborative information seeking. As shown by Figure 6, interactions within information seeking can be seen as existing on a continuum ranging from singular information seeking, through distributed information seeking, and into collaborative information seeking. During singular information seeking, the information seeker interacts with no one during the information seeking activity. During distributed information seeking, the information seeker interacts with external agents or systems that help select information sources, and physically gather the information. During collaborative information seeking, multiple information seekers work together throughout all stages of the information seeking activity.

This chapter also described the basic properties of groups. Groups can be seen as synergistic entities, where the work, the product, the decision, or knowledge held by a group is more then could be produced by individuals working alone. Through explicit assignment or tacit negotiation, group members assume roles within a group. Roles describe activity and responsibilities each group member has within the group.

This chapter ended with a discussion of the nature of collaborative information seeking. The key feature of collaborative information seeking is the involvement of people during the various stages of the information seeking activity. Each of the stages of the

information seeking activity was presented, and the types of interactions that occur were discussed.

4 Research Background and Design

As discussed in Chapter 1, the goal of this research was to examine collaborative information seeking, and to develop a model of collaborative information seeking. The data collection and analysis methodologies used were structured to provide an insight into the collaborative information seeking activity. A real world example of a complex collaborative information seeking activity was selected and analysed. Out of this analysis, a model of collaborative information seeking was developed. This chapter describes the data collection and analysis methodologies and the research domain used to develop the model of collaborative information seeking. The application of the data collection and analysis methodologies is discussed in detail in Chapter 5, and the final model of collaborative information seeking is presented in Chapter 6.

4.1 Research Design

The first research design question to be answered was: would a qualitative or quantitative research approach best meet the research goals? This question was initially taken to the information seeking literature. A detailed review of the information seeking literature revealed that both qualitative and quantitative research methodologies have been used successfully in the past.

Within information seeking research, quantitative approaches often focused on user studies, and gathering and analysing the information seeker's view on particular sources or particular information (Cheuk 1998, Gralewska-Vickery 1976, Leckie, et al. 1996 and Tseng and Atkin 1997) through to building profiles of users' attitude to information, and their information seeking personalities (Palmer 1991; Bonner, et al. 1998).

Qualitative research methods ranged from the interview approach of Ellis (1989), through to the observational, almost ethnographic approaches of Kuhlthau (1991) and Palmer (1991). There have also been attempts to combine both; Palmer's (1991) work on building an understanding of information seeking personalities combines both qualitative and quantitative methods.

What seemed to emerge as the major difference between previous studies on information seeking using a qualitative approach and previous studies on information seeking using a quantitative approach, was the degree to which the context of the phenomenon under study was included. As Kaplan and Duchon (1988) point out, the "immersion in context is a hallmark of qualitative research methods and the interpretive perspective on the conduct of research" (Kaplan and Duchon 1988).

As discussed in Chapter 1, the goal this work was to build an understanding of information seeking as it existed within a collaborative context, and to examine the influence the group has on the information seeking activities, as well as on the groups' synergistic approach to information seeking. Therefore, it was decided that a qualitative approach to both gathering and interpreting data would be used.

The second research design question to be answered, was what study domain would provide data that could be used to build an understanding of collaborative information seeking? Ideally, the study domain should involve a group of collaborating information seekers performing non-trivial information seeking tasks. Non-trivial information seeking tasks, are information seeking tasks which involve collecting data from various different sources to satisfy the groups' information seeking needs. The ideal study domain should also make use of a variety of information sources, ranging from traditional library sources, book, journals, and so on, through to using people as an information source. The group of information seekers under study should also be willing to allow their actions to be observed and/or captured in some way, as well as being willing to allow the analyst the opportunity to question them about their actions and behaviours.

The Command and Control Support Study (C2S Study) performed by the Defence Science and Technology Organisation (DSTO) met many of the above criteria. The C2S Study (described in detail later in Section 4.3) represented a complex, collaborative information seeking activity. The information collected by the C2S Study ranged from simple factual information, through to complex judgements and opinions. Information for the C2S Study was gathered from both personal and impersonal information sources.

The work of the study had been well document within the C2S Study's meeting minutes. As will be discussed later in this chapter, the meeting minutes proved to be an excellent

record of the actions and behaviours of the collaborating information seekers. The C2S Study's participants were also willing to be interviewed by the researcher about their information seeking experiences during the C2S Study.

The final research design question to be answered was what qualitative research methodology would be best suited to the research questions, and the study domain selected? Any research methodology selected would have to be able to deal with the retrospective nature of the investigation into the C2S Study, as well as being able to deal with different types of data collection methodologies used. The qualitative research methodology would also need to provide a structured way of analysing the large amount of data collected.

Grounded Theory, described later in Section 4.2, emerged as being able to meet all of these needs. Grounded Theory is a research methodology which does not prescribe any particular data collected approach. Rather it provides a structured way of analysing large amount of qualitative data, while still maintaining the flexibility of qualitative analysis. Grounded Theory has been used successfully with a variety of data collection methods, including interviews and observations methodologies, as well as document and archival research. It has also been used successfully with a combination of different data collection methodologies (Schwartz and Jacobs 1979; Strauss 1987; Strauss and Corbin 1990). Grounded Theory has also been successfully applied to previous work in information seeking. For example, Ellis's behavioural model of information seeking was built using a Grounded Theory approach (Ellis 1989; Ellis, Cox et al. 1993; Ellis and Haugan 1997).

4.2 The Grounded Theory Methodology

This section describes the Grounded Theory methodology used to analyse the data collected. Grounded Theory is well documented in Glaser and Strauss (1967), and Strauss (1987), with Strauss and Corbin (1990) providing an excellent beginners' guide to applying grounded theory.

Grounded Theory is "an inductive, theory discovery methodology that allows the researchers to 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). Grounded Theory can be seen as an approach to qualitative research that provides a set of methods for developing a theoretical formulation of the reality being studied. The Grounded Theory method provides mechanisms to provisionally test the theory as it is developed, in this way, the approach provides for internal validation of the theory (Strauss 1987).

Grounded Theory is a data analysis method. It does not prescribe any particular data collection methods, and has been used on observational data, interview data, as well as within document and archive research, as well with various combinations of different data collection methods (Strauss and Corbin 1990).

Grounded Theory has been applied to the analysis of a variety of social phenomenon, from Glaser and Strauss's (1967) initial work on Awareness of Dying which inspired its conception, through to Strauss's later work on hospital organisation (Strauss 1987). Martin and Turner's (1986) paper lists over a dozen different studies within organisational settings that successfully made use of grounded theory.

Figure 7 describes the main elements of the Grounded Theory methodology. As shown, Grounded Theory can be seen as consisting of three stages, all heavily influenced by the analysis's theoretical sensitivity (Schwartz and Jacobs 1979).

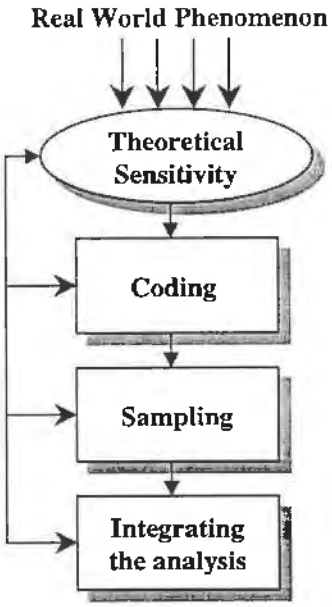

Figure 7. The Grounded Theory Process.

It is important to note that, although Figure 7 presents Grounded Theory as a linear progression through several well-defined steps, in reality the process is very dynamic, cyclic and iterative (Schwartz and Jacobs 1979; Martin and Turner 1986; Strauss 1987).

As shown in Figure 7, Grounded Theory analysis consists of five major components. The real world phenomenon, the analysis's theoretical sensitivity, coding, sampling, and integrating the analysis.

Grounded Theory begins with a real world phenomenon. As described previously, Grounded Theory has been applied to a wide selection of social phenomenon, and seems to be suitable to analysing most forms of complex, small scale, socially driven situations, actions or events (Martin and Turner 1986).

An overarching influence on the development of a Grounded Theory is the development of theoretical sensitivity. Theoretical sensitivity described the analyst's "awareness of the subtleties of meaning of data" (Strauss and Corbin 1990). As both Strauss and Corbin (1990), and Schwartz and Jacobs (1979) point out, initial theoretical sensitivity will come from preconceived ideas about the phenomenon under study. These may be taken from personal experiences or from the literature on the area, or a combination of both. During the initial stages of a Grounded Theory study, the analyst's initial theoretical sensitivity, drives the initial collection and analysis of the data. As the analysis of the data progresses, the analyst's theoretical sensitivity increases. This affects future data collection, as well as the analysis of the data already collected. As Strauss and Corbin (1990) point out, it is important to structure data collection so there is time to analyse the data during the collection phases of the research. This allows the analyst to continue to develop theoretical sensitivity, and to continue to refine the exact elements of the real world phenomenon to be examined.

As the above description of theoretical sensitivity indicates, theoretical sensitivity depends almost totally on the analyst, and the analyst's ability to develop openness to their data and the phenomenon being studied. The quality and insight offered by any Grounded Theory study will heavily depend on the analyst's abilities (Strauss 1987).

The actual analysis of the collected data begins with the coding of the data collected. Within Grounded Theory development, coding can be seen as the process of analysing

data (Strauss and Corbin 1990). As pointed out by Schwartz and Jacobs (1979), coding combines the collection of data, its categorisation and the development of theories about the data. Coding moves in levels of abstraction, from a low level of abstraction during the initial open coding of the collected data, through to a higher level of abstraction during selective coding. At the low level of abstraction the analyst is dealing directly with the data, at the higher levels of abstraction the analyst is dealing with the concepts, of which the data is an example (Schwartz and Jacobs 1979; Martin and Turner 1986).

Strauss and Corbin (1990) advocate three distinct forms of coding each aimed at increasing the detail and complexity of the analysis of the data. The three forms of coding are:

- Open Coding
- Axial Coding
- Selective Coding

Within Grounded Theory, the coding of the gathered data involves identifying interesting concepts or events, and building an understanding of what the concept or event means in the context of the phenomena under study. Coding of data collected for a Grounded Theory study normally begins with open coding. The goal of open coding is to *open up* the phenomenon under study in order to produce concepts that fit the data. Concepts (or labels as described by Martin and Turner (1986)) can be seen as conceptual labels placed on discrete happenings, events and other instances of phenomena (Strauss and Corbin 1990). During the initial stages of open coding the data is analysed minutely, line-by-line, word by word, phrase by phrase and minor event by minor event. The description of the concepts is provisional, and will be modified, enhanced, and dropped as the analysis continues (Strauss and Corbin 1990).

Once similar concepts seem to emerge out of the data repeatedly, the analyst must pull back from assigning concepts to the data, and begin to pull the concepts into categories. A category can be seen as a classification of concepts, which groups like concepts together. While concepts are often just labels for the actual data, categories are more complex and abstract (Strauss and Corbin 1990).

Once concepts begin to fall into well defined categories, and the properties of the different categories are beginning to be well defined and have a feeling of completeness to them, Strauss and Corbin (1990) advocate moving onto axial coding. During axial coding, the relationships between the different categories identified during open coding are found and described in terms of conditions, context, action/interactional strategies and consequences (Strauss and Corbin 1990). This relationship is described in Figure 8.

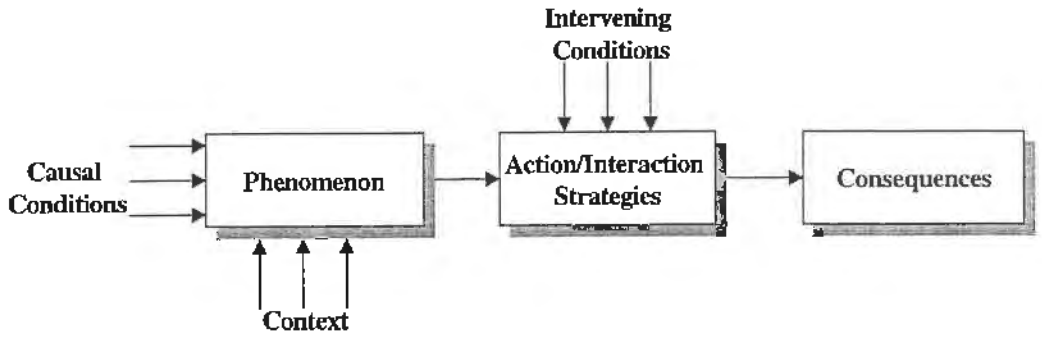

Figure 8. The Cause and Affect Relationship within Grounded Theory.

As shown in Figure 8, the phenomenon under study can be seen as the result of some casual conditions, within a specific context. As with categories, causal conditions can be described in terms of the their properties, and the value of their property along a dimension. The phenomenon, then, causes individuals to create action/interaction strategies. Action/interaction strategies describe how the individuals act or react to the particular events. The action/interaction is purposeful, goal oriented, done for some reason, in response to or to manage the phenomena (Strauss and Corbin 1990).

Any action/interaction strategies an individual may perform are tempered by any intervening conditions. Intervening conditions are conditions that act to either facilitate or constrain the action/interaction strategies taken within a specific context. The intervening conditions effect the action/interaction strategy, that is, what the individuals do to manage the phenomenon (Strauss and Corbin 1990).

Any action/interaction strategies undertaken by the individual will result in some type of consequences. Consequence may not always be what was intended and may not always be predictable. Consequences may be real or potential, and a consequence of one action/interaction may end up being the part of the conditions for the next set of actions/interactions. The result of relating the uncovered categories to each other

through the use of the case and affect paradigm is a detailed understanding of how different events, actions and reactions each relate to each other (Strauss and Corbin 1990).

Strauss and Corbin's (1990) final coding process, selective coding, aims at building these categories and their relationships into a detailed "analytical story of the phenomenon" (Strauss and Corbin 1990). The analytical story of the phenomenon is represented by the core category. The core category becomes central to the Grounded Theory under development, and once selected, the remaining, relevant categories are related to it in terms of the conditions, context, action/interactional strategies and consequences.

The three different coding activities result in what Schwartz and Jacobs (1979) describes as a "first stab at what is going on" (Schwartz and Jacobs 1979). It identifies a specific phenomenon, or small set of phenomenon, describes its properties and their dimensions, and shows how the phenomenon is related to other phenomenon. The next stage of the development of a Grounded Theory is the process of theoretical sampling.

Within Grounded Theory, theoretical sampling can be seen as the process of testing the evolving Grounded Theory within new contexts. As a result of the initial coding work, the analyst will have build a detailed understanding of a particular phenomenon, within a singular or small set of contexts. When performing theoretical sampling the goal is to take the initial understanding and examine how well it describes the same phenomenon within different context (Schwartz and Jacobs 1979). Sampling adds depth and utility, by adding a level of generality to the Grounded Theory being developed. (Strauss and Corbin 1990).

The final part of the development of a Grounded Theory is integrating it together to form an integrated, substantive theory which describes the phenomenon under study. This is often the most difficult part of the development of a grounded theory. It often involves a combination of theoretical sampling of the theory, to add depth and generality to it, as well as the final writing up of the developed theory (Strauss 1987).

4.3 Research Domain -- The Command and Control Study

The study domain selected for this research was the Command and Control Support (C2S) Study. The C2S Study was a complex analysis of defence capability involving staff from the Defence Science and Technology Organisation (DSTO) as well as service[2] representatives from the Australian Defence Force (ADF). The goal of the C2S Study was to:

- Assess the extent to which the new ADF Command Arrangements can be supported by the current, planned and government approved ADF C2 support capabilities
- Determine the major capability strengths, limitations, inefficiencies and redundancies in the ADF C2 support capabilities
- Develop and assess a range of broad options, including indicative costs, which redress identified capability limitations, inefficiencies and redundancies in the ADF C2 support capabilities (DSTO 1996).

From the perspective of information seeking, the study was a difficult undertaking, which prompted the collection of large amounts of complex information. The information collected ranged from simple factual information, for example the number of available Navy frigates, through to complex judgemental information, for example the performance of a defence equipment during operations, through to complex organisational information, for example how would a peace keeping force be structured for a specific peace keeping situation.

The C2S Study was divided into three phases, and it ran from early 1996 until early 1998. The first phase of the C2S Study, Phase One represented the study team orientating itself, by building key definitions, and identifying the work to be done. Phase Two of the C2S Study represented the bulk of the data collection and data analysis activities. Phase Three involved the development of recommendations to improve current and planned defence capability.

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[2] The term *Service* collectively describes the Army, Navy and Air Force

The research described in this thesis focuses almost entirely on the work performed in Phases Two and Three of the C2S Study. Phases Two and Three of the C2S Study involved the use of the C2S Study Working Group. This group consisted of both DSTO and ADF representatives. The ADF representatives were staff officers drawn from the ADF headquarters, and represented a broad cross section of the organisation. The C2S Study Working Group and their interactions are the focus of the research described in this thesis.

Two types of data were collected from the C2S Study, the minutes from the C2S Study Working Group meetings and interviews with C2S Study Working Group participants. As shown later in Chapter 5, the meetings minutes provided detailed descriptions of the activities of the Working Group as it collected and analysed information. The interviews with the Working Group participants were seen as a way of gaining a behind the scenes perspective of the activities describes by the meetings minutes. Combined, both sets of data provide a well rounded description of the collaborative information seeking activity as performed by the C2S Study Working Group.

4.4 Summary

The C2S Study Working Group was selected as the domain to study for the research described in this thesis. The C2S Study Working Group represented a complex collaborative information seeking activity, involving representatives from both DSTO and the ADF. From this study domain, two different sets of qualitative data were collected, namely, the minutes of the C2S Study Working Group meetings, and semi-structured interviews with Working Group participants.

Grounded Theory was used to analyse the data collected. Grounded Theory is a well-tested method for analysing complex qualitative data. It is an approach to data analysis, and is designed to work with data collected using a variety of qualitative methods. The results of the analysis of the collected data using Grounded Theory, and the model developed from this analysis, is the subject of the next two chapters.

5 Data Collection and Analysis Collection Using Grounded Theory

As discussed in Chapter 4, the Grounded Theory methodology was used to guide the collection of data, the analysis of the data and development of the collaborative information seeking model. This chapter describes how the data was collected and how the Grounded Theory methodology was applied to construct the model of collaborative information seeking. The model of collaborative information seeking developed is presented in the next chapter. While this chapter presents the data analysis and the development of the collaborative information seeking model as a linear and ordered process, in reality it was a very dynamic, cyclic and interactive activity.

This chapter begins by discusses the data collected from the C2S Study Working Group, and the data collection methods used to gather the data. Next, the analysis of the data and the development of the collaborative information seeking using the Grounded Theory methodology are described.

5.1 Data Collection Using Grounded Theory

As discussed in Chapter 4, two types of data were collected from the C2S Study, the minutes from the C2S Study Working Group meetings, and interviews with C2S Study Working Group participants.

The minutes collected from the C2S Study Working Group meetings provided a detailed description of the activities the Working Group performed as it collected the information needed for the C2S Study. The minutes provide insights into the actions and activities performed by the C2S Study Working Group participants. The minutes describe who was responsible for collecting what information, what decisions needed to be made during the different stages of the information seeking activities, who made the decisions, as well as describing the problems encountered during the information seeking activities, and how they were resolved.

The interviews with the C2S Study Working Group participants were seen as a way of gaining a behind the scenes perspective of the actions, and activities described by the

Working Group minutes. The goal of the interviewers was to try to capture data which described why the various actions and activities were performed, and what the different participants were thinking, feeling and hoping to achieve with their actions.

5.1.1 Developing Theoretical Sensitivity

As described in Chapter 4 the Grounded Theory methodology begins with the development of the analyst's theoretical sensitivity. This is shown in Figure 7. For the research described in this thesis, the analyst developed theoretical sensitivity in two distinct ways, through the development of the conceptual model of information seeking, described in Chapter 2, and through involvement in the C2S Study Working Group.

The development of the conceptual model of information seeking described in Chapter 2, helped develop a theoretical sensitivity toward individual information seeking, and the activities performed by individuals to satisfy their information needs. This sensitivity allowed the analyst to identify comparable group and collaborative activities within the C2S Study Working Group.

Theoretical sensitivity was also obtained through the analyst's involvement in the C2S Study Working Group. This involvement gave the analyst a detailed understanding of the group interactions, and group processes present within the C2S Study Working Group. This sensitivity help in understanding the group processes that contributed to the collaborative information activities performed by the working group.

5.1.2 Command and Control Study Working Group Minutes

In total, there were 40 C2S Study Working Group meetings held. On average, each meeting lasted for 130 minutes, taking a total of 5140 minutes (about 85 hours) of meeting time. An average of four pages of meeting minutes was recorded for each meeting, resulting in 156 pages of minutes to be analysed. The vast majority, 82.5%, of the meeting minutes were recorded by the same person, with 12.5% being recorded by the author. The remaining 5% were recorded by two additional meeting participants. This resulted, for the most part, in a very consistent style, and a consistent level of detail in the majority of the minutes analysed.

The C2S Study working group meetings had a formal structure with an agenda circulated before each meeting. Minutes of the meetings were kept, and formal actions were assigned to meeting participants. While formal in structure, the meetings themselves were run in a relaxed manner. Discussion was encouraged, and the formal agenda was generally broad enough to allow for wide ranging discussions. Meeting participants were also encouraged to raise items they felt were related to the work being performed, even though they may not have been an agenda item.

Details of each meeting, and the minutes recorded can be found in Appendix B.

5.1.3 Interviews with Study participants

Semi-structured interviews were used to gather data from C2S Study Working Group participants. Semi-structured interviews provide a comprehensive technique for gathering very detailed data describing the attitude, beliefs and reasoning of informants (Schatzman and Strauss 1973; Kvale 1996). An Interview guide was used to ensure all participants were asked similar questions (the interview guide used is reproduced in Appendix A). However, interviewees were encouraged to move off the topic if appropriate. This resulted in a rich set of interview transcripts (the interview transcripts are reproduced in Appendix C).

Due to the nature of the ADF's posting cycle, involvement of ADF representatives in the C2S Study Working Group was transient. ADF members work, or are posted, in any given position for around one to two years. After completing their posting, they are moved into different positions. Therefore, no ADF representatives were involved in the C2S Study Working Group throughout its entire three year lifetime. Only two DSTO representatives were involved in the C2S Study Working Group over its entire three year lifetime.

Over the C2S Study Working Group's three year lifetime, a total of 28 active[3] participants were involved, with an average of nine participants involved in the Working Group at any given time. Out of this potential pool of informants, five were selected for interview.

[3] Active participants are participants who attended more then one working group meeting

Given the small pool of potential informants, no formal sampling methods were used to select informants for interviews. Of the five informants selected for interview, two were DSTO representatives who had been involved in the C2S Study Working Group through out its entire three year lifetime. The remaining three informants were ADF representatives who were most recently involved in the C2S Study Working Group, and had all been involved in the C2S Study Working Group for at least one year. They also represented a good cross section of the different ADF representatives who participated in the study over its lifetime.

Participants were interviewed using semi-structured interview techniques. The interviews were tape-recorded and the tape recordings transcribed. The interviewer made notes during the interviews, as well as recording an overview of the interview, and impressions of the interview. Each interview lasted, on average 40 minutes, and generated an average of 12 pages of transcripts, resulting in 61 pages of interview transcripts for analysis.

The following table describes the participants interviewed, their role within the C2S Study Working Group, as well as the date and location of each interview.

ID	Date of Interview	Location of interview	Role of informant
D1	12/April/1999	Fern Hill Park, Canberra	• Chair • DSTO Rep • WG Member
D2	28/April/1999	Fern Hill Park, Canberra	• WG Member • P/T Chair • DSTO Rep
S1	16/April/1999	Russell Offices, Canberra	• Service Rep • WG Member
S2	30/April/1999	Russell Offices, Canberra	• Service Rep • WG Member
S3	4/May/1999	Fern Hill Park, Canberra	• Service Rep • WG Member

Table 1. Interview Schedule of C2S Study Participants.

Dx is used to refer to DSTO representatives interviewed. *Sx* is used to refer to Service representatives interviewed. Additional information on each interview, as well as edited versions of the interview transcripts can be found in Appendix C.

As recommended by Strauss and Corbin (1990) data collection and analysis were performed in parallel. This allowed the analyst to continue to develop theoretical

sensitivity to the phenomenon under study, as well as allowing the analyst to focus and re-focus the data collection to best answer questions uncovered during the analysis.

5.2 Data Analysis Using Grounded Theory

During the development of the collaborative information seeking model, the data collection and data analysis activities were divided into three distinct phases:

- Phase One focused on the open coding and axial coding of the minutes of the Working Group meetings. The goal of this phase was to identify *who* and *what*. That is, who was involved in the collaborative information seeking activity, and what actions or activities they performed.
- Phase Two included the first round of interviews with working group participants. The goal of this phase was to build an understanding of *why*. That is, why the participants did what they did during the collaborative information seeking activity.
- Phase Three included the final round of interviews. The goal of this phase was to add detail to the analysis performed so far, and to develop the final analytical story of collaborative information seeking.

Each of the phases is described in more detail in the following sections.

5.2.1 Phase One -- Open and Axial Coding

Phase One of the analysis focused on the minutes of the C2S Study Working Group meetings. The goal of this phase of the analysis was to build an initial understanding of *who* and *what*. That is, who was involved in the collaborative information seeking activities and what functions, tasks and roles they performed. This phase of the analysis was also used to develop the analyst's theoretical sensitivity toward the phenomenon under study.

As discussed in Chapter 4, the C2S Study Working Group collected large amounts of complex information, ranging from simple factual information, through to complex judgements and previous experiences. The Working Group collected information from a variety of different information sources, including library sources, such as books, journals, and so on, through to informal information sources, such as people, and lessons learnt collections from defence exercise.

The C2S Study Working Group meeting minutes capture the behaviours and work of the collaborating information seekers, including the group's information needs, how these information needs were satisfied, who was responsible for meeting those information needs, and any problems they may have encountered. The minutes also include summaries of the discussions between Working Group members as they discussed what the gathered information meant in terms of what was already known, what additional information would be needed to complete the work of the C2S Study, as well as potential ways of gathering additional information.

Initially the C2S Study Working Group meeting minutes were *open coded*. The goal of this coding was to open up the data collected so far. This initial coding resulted in many tightly related concepts describing the different actions performed by working group members. These concepts were recorded directly on the pages of the meeting minutes, and in working notes made by the analyst during this stage of the analysis.

Axial coding was then performed on the concepts uncovered during open coding. The goal of axial coding was to work through the concepts uncovered during the open coding activity, and to relate them together to form categories. The categories that emerged out of the axial coding activity fell within two groups; categories that described the *roles* the different information seekers adopted as the Working Group collected information and categories that described the *patterns* of behaviours and activities that frequently clustered together within the Working Group minutes.

The following two tables, show the role categories and the pattern categories that resulted from the axial coding activity on the concepts uncovered from the Working Group minutes.

These tables are the result of the first two coding activities, that is the open and axial coding, of the meeting minutes. Open and axial coding are described in more detail in Section 4.2 The Grounded Theory Methodology.

Category Name	Description	Data Location[4]
Instigator	• Starts the information seeking activity. • Monitors the information seeking activity once it is under way.	M1; M3; M12; M15; M16; M17; M20; M29
Information Verifiers	• Checks the information gathered. • Make sure the information gathered makes sense and fits with already known information.	M8; M9; M20; M22; M25; M31; M36; M37; M38
Organisational Association & Perspective	• Brings a particular perspective to the information seeking activity. • Influences the information seeking activity with his/her organisational view. • Tightly related to the Organisational Gateway role.	M4; M8; M9; M15; M16; M18; M19; M20; M31; M32
Referrer/Chain	• Moves interesting information into the working group, or to specific members of the working group.	M1; M4; M13; M15; M16; M19; M26
Organisational Gateways	• Provides an 'in' into a particular part of the organisation. • Working group members act as a gateway or as an interface into a large domain of knowledge/expertise/information. This seems to be tied to the part of the organisation they represent.	S21-28; M1; M4; M6; M13; M14; M15; M18; M20; M25; M26; M28; M30; M32; M34
The Introducer	• Seems to occur a lot when ADF representatives introduce the DSTO representatives to people they think might be interesting to talk with.	M13; M14; M20; M28; M30
Thinkers, suggesters, comment providers, information gathers	• Do the bulk of the 'work' of the C2S Study Working Group. • Analysis the information, provide answers to the questions, validate the information, and so on.	M3; M4; M5; M6; M7; M8; M11; M15; M16; M17; M20; M26; M28; M30; M31 ;M33; M35; M36

Table 2. Initial Role Categories.

Category Name	Description	Data Location
Information Discloser	• When Working Group members make it known to the Working Group what information they have, or have access to.	M4; M12; M13; M32; M34
Information Seeking Tasking	• Where we seen the Working Group members tasked by the information seeking instigator to gather specific information.	M1; M3; M5; M7; M9; M11; M12; M15; M16; M 17; M20; M27
Information Referring	• Acts as an index for information held within an organisation and/or the organisation information base. • Analogous to a journal abstracting service.	M13; M29; M30; M32

Table 3. Initial Pattern Categories.

These initial categories were used as the starting point for the second phase of the analysis.

[4] The data locations refer to the minutes of the Working Group meetings. M1, for example refers to the minutes of meeting one, M2, refers to the minutes of meeting two, and so on.

5.2.2 Phase Two -- Axial Coding and Interviews

During this phase of data collection and analysis, the first round of interviews with Working Group participants was held, and the first attempt at combining the data collected from the Working Group minutes with the data collected from the interviews was performed.

As shown previously in Table 1, interviews were staggered over a three week period. The first round of interviews, held during this phase of the analysis, consisted of interviews with D1 and S1. These interviews were seen as a way of adding detail to the categories uncovered during the first phase of the analysis, by building an initial understanding of the motivation and the reasoning Working Group participants had for the activities and actions recorded within the minutes.

The interviews used a semi-structured approached, with the same interview guide being used for both interviews. However, interviewees were encouraged to move off the topic when appropriate. The interviews were tape-recorded and the tape recordings transcribed. The interviewer also recorded a summary and his impressions of the interview immediately after the interview was completed.

Data collected from the initial two interviews was open coded, resulting in a large collection of concepts. These concepts were then pulled together through axial coding, and related to the existing role categories and pattern categories uncovered during Phase One of the analysis. The following two tables revise the role categories and the pattern categories to include the data gathered from the first two interviews.

Category Name	Description	Data Location[5]
Group Manager	• Responsible for managing the group activity • Dealing with problems • Motivating group members	D1 97-100, 239-241; S1 238-241; M1
Information Seeking Instigator	• Starts the information seeking activity. • Monitors the information seeking activity once it is under way.	D1 21-28, 111-114, 134-140; M1; M3; M12; M15; M16; M17; M20; M29
Information Verifiers	• Checks the information gathered. • Make sure the information gathered makes sense and fits with already known information. • Information is checked, regardless of the source.	M8; M9; M20; M22; M25; M31; M36; M37; M38
Information Referrer	• Moves interesting information into the working group, or to specific members of the working group.	D1 1-7; S2 67-99; M1; M4; M13; M15; M16; M19; M26
Information Index/Abstracter	• Analogous to the bibliographic system or index/abstract service. • Provides pointers to people likely to hold needed information.	M6; M9; M13; M14; M16; M15; M18; M19; M20; M26
Information Gatherer	• Responsible for physically gathering the information identified as being important. • This role is often tasked by the Information Seeking Instigator Role.	D1 21-28, 111-114, 134-140; M1; M3; M12; M15; M16; M17; M20; M29; M33; M35; M36

Table 2. Revised Role Categories.

Category Name	Description	Data Location
Seeking by Provocation	• When Working Group members make it known to the Working Group what information they have, or have access to.	D1 21-28, 111-114, 134-140; M1; M3; M4; M12; M15; M16; M17; M20; M29
Direct Questioning	• Information Gatherer is tasked by the information seeking instigator to gather specific information.	M1; M3; M5; M7; M9; M11; M12; M15; M16; M 17; M20; M27
Information Seeking by Recommendation	• Information is passed to the information seeking instigator by an information referrer. • Decision to pass information is based on perceived information interests of the instigator	M13; M18; M20; M29; M30; M32
Advertising Representation	• Advertises the existence of an information index • May advertise his/herself, or another person known to him/her	M4; M10; M12; M26 M13; M32; M34

Table 3. Revised Pattern Categories.

The combining of the categories from both the analysis of the meeting minutes and the initial interviews added theoretical density to the categories by providing a balanced description of them. So, not only were the categories objectively described as a result of

[5] The data locations refer to the minutes of the Working Group meetings, and lines within the interview transcripts.

the coding of the minutes, but there were also subjectively described by the working group participants as a result of the discussions provided by the interviews.

In addition to adding density to the two existing categories groups, (that is the roles and the patterns) this stage of the analysis also uncovered a new group of categories. When the descriptions of the information seeking activity provided by the two interviewees was compared with the description of information seeking provided by the meeting minutes, an importance group of categories emerged which described the *context* in which elements of the collaborative information seeking activity took place. Within this thesis, the term context is used to mean a collection of events, histories, culture, knowledge and understanding, which exist together at a point in time (Dervin 1996)[6].

Rather then seeing context as an information seeking role, or an element of an information seeking role, (as shown in Tables 2 and 3) context can be seen as something which pervades and affects all the roles and activities the information seekers may be involved in. Context seemed to affect the activities performed, and people who work within it. For example, the C2S Study Working Group can be seen as a context. The activities performed within the C2S Study Working Group are affected by the norms, histories, culture, language, knowledge and understanding of the Working Group. All activities performed by the group or by individuals working within the group, are affected and influenced by this context.

Out of the data collected and analysed so far, three different of contexts seemed to emerge. These different contexts are shown in Table 6.

[6] Dervin (1996) also provides a very detailed review of the different ways the term context is used.

Context Name	Description	Data Location
Organisation Context	• The context from which representatives are drawn from.	S1 21-28; M1; M4; M6; M8; M13; M14; M15; M16; M18; M19; M20; M26; M28; M30; M31; M32; M34
Collaborative Information Seeking Context	• The context in which the collaborative information seeking activities take place.	S1 21-28; M1; M4; M6; M8; M13; M14; M15; M16; M18; M19; M20; M26; M28; M30; M31; M32; M34
Information Context	• The context describes where the information being sought existed. • Describes the rules, language, expectations, and so on associated with the information.	S1 21-28; M1; M4; M6; M8; M13; M14; M15; M16; M18; M19; M20; M26; M28; M30; M31; M32; M34

Table 6. Different Contexts Identified.

The *organisational context* describes where participants within the Working Group were drawn from. For example, the part of the organisation S1 was drawn from can be described as his organisational context. The norms, histories, culture, language, knowledge and understanding of this part of the organisation affects the way S1 performs any activities he is involved in. The second context uncovered was the *collaborative information seeking context* (the C2S Study Working Group) which describes the norms, histories, culture, language, knowledge and understanding of the Working Group. The final context uncovered is the *Information Context*. The Information Context describes where the information being sought existed. The concept of context was explored in more detail during the final phase of the analysis.

The three components uncovered so far, the roles, the patterns and the context, were used as the starting point for the final phase of the data collection and analysis activity.

5.2.3 Phase Three -- Selective Coding and the Analytical Story

The final phase of the analysis, Phase Three, focused on gaining an understanding of how the different categories uncovered during the first two phases of the analysis worked together to describe the activity of collaborative information seeking.

This phase of the analysis consisted of the second round of interviews with the remaining three Working Group participants. These interviews were seen as a way of adding detail to the analysis performed so far, as well as collecting data that would show the relationships between the different groups of categories. This phase of the analysis also focused on building the final analytical story, which described collaborative information seeking as performed by the C2S Study Working Group.

As previously shown in Table 1, the second round of interviews consisted of interviews with D2, S2, and S3. These interview transcripts were initially open coded. The emerging concepts were then pulled together into categories through axial coding, and combined with the categories uncovered during Phase Two of the analysis.

The roles, patterns and contexts described by these interviews transcripts were matched against the roles, patterns and contexts already uncovered from the previously analysis. In most cases, there was a very strong relationship between the results of the previous analysis and the result of the coding of these transcripts. This strong relationship indicated that the categories already uncovered had a degree of completeness to them, and that they captured the collaborative information seeking activity. These revised information seeking roles and patterns then became the bases for the collaborative information seeking model described in the next chapter.

In addition to adding detail and depth to the roles, and patterns already uncovered, this stage of the analysis also uncovered an additional role, that of the Group Administrator. While the Group Administrator role could be retrospectively identified within the previously collected data, the role only became obvious as a result of the interview with D2, who explicitly described this role (D2 175-178). Once this role was identified, the previously collected data was explicitly analysed for this role.

The revised collaborative information seeking roles and collaborative information seeking patterns are shown in Tables 7 and 8. The collaborative information seeking roles and the patterns are described in more detail in the next chapter.

Role Name	Description	Data Location
Information Referrer	• Direct unsolicited information to members of the Working Group.	S2 267-269; D1 7-9; D2 222-248; S1 67-99; S3 244-250; M1; M4; M13; M15; M16; M19; M26
Information Gatherer	• Responsible for gathering the actual information. • Tasked/directed by the information instigator • Selected to gather based on previous work, or advertisement of access to specific groups of information.	D1 482-486; D2 89-98; M1; M3; M12; M15; M16; M17; M20; M29; M33; M35; M36
Information Verifier	• Responsible for checking and validating the information gathered.	D2 158-163; S3 158-163; S2 177-191; M8; M9; M20; M22; M25; M31; M36; M37; M38
Information Seeking Information Seeking Instigator	• Starts the information seeking activity. • Tasks an Information Gatherer with an information gathering task. • Monitors the progress of the information seeking activity.	D1 111-114; D1 134-140; D2 254-275; S3 155-158; D1 21-28, 178-205; M1; M3; M12; M15; M16; M17; M20; M29
Information Index/Abstract	• Provides pointers to people as sources, or other sources of information.	D2 58-68; D1 23-28; S3 9-19; D2 7-18; M6; M9; M13; M14; M16; M15; M18; M19; M20; M26
Group Administrator Role	• Administration of the group activity. Organising group activities and maintaining resources.	Almost all the minutes; D2 175-178.
Group Manager	• Manages the group. Maintains the group momentum. • Deals with problems with group members.	D1 97-100; D2 171-175; D1 239-241; D1 45-61; D2 200-220; M1

Table 7. Revised Role Categories.

Pattern Name	Description	Data Location
Seeking by Provocation	• Problem presented. • Working Group Discusses the problem. • Information seeking tasks assigned.	D1 256-370; D2 249-275; S2 181-198; M1; M3; M4; M5; M7; M8; M9; M11; M12; M16; M17; M18; M20; M29; M31.
Information Seeking by Recommendation	• Information Referrers directed unsolicited information to Information Seeking instigators.	S1 71-117; D1 151-177; M13; M18; M20; M24; M29; M30; M32; M34;
Direct Questioning	• Information Gathers are directly tasked by the information seeking instigator. This tasking is based on the representative's gateway and perspective.	S1 71-117; D1 151-177; D2 227-234; D2 249-275; S2 181-198; M1; M3; M5; M7; M9; M11; M12; M15; M16; M 17; M24; M20; M27
Advertising Representation	• Representatives advertise what information they would be able to access. This pattern is used to maintain an awareness of people as information sources.	D2 63-69; D1 71-119; D1 21-27; M4; M7; M10; M12; M26 M13; M32; M34

Table 8. Revised Pattern Categories.

As well as adding detail to the collaborative information seeking roles and patterns uncovered during the previous two stages of analysis, this stage of the analysis added detail to the emerging concept of context. This stage of the analysis also uncovering data which showed the relationship between the different categories uncovered during the first two phases of the analysis.

The concept of a representative is used to describe an individual who adopts any one of the information seeking roles, or participates in any of the information seeking patterns. Representatives represent or bring the context of the part of the organisation they are drawn from into the parts of the organisation they are drawn into. For example, the three services representatives (S1, S2 and S3) move from working in their organisational context to working within the collaborative information seeking context as a result of their involvement within the C2S Study Working Group. As the service representatives move from their part of the organisation to work within the C2S Study Working Group, they bring with them their organisational context.

As discussed previously, the concept of context emerged out of the data collected during the first two phases of the analysis. Initially, context was seen as being an information seeking role or an element of an information seeking role (see Tables 2 and 4 for examples of this). However, as more data was collected and analysed, context seemed to emerge as something that existed outside of any particular information seeking role. Context began to emerge as something that can be seen as being embedded in the person who enacts any particular information seeking role, or participates in any information seeking pattern.

The context brought by representatives as they move from the C2S Study Working Group to their organisational role (that is, their position within the ADF) can be described in terms of their organisational perspective and their organisational gateway. A representative's organisational perspective can be described as how they see the world, and what elements they see as being important. A representative's organisational gateway can be seen as a two way connection or conduit between organisation context the representatives was drawn from (their ADF position), and the context in which they are working (in this case the C2S Study Working Group). These two concepts, as well as the concept of representation are discussed in more detail in Section 6.2 of the next chapter

This final phase of the analysis was also used to uncover data that described the relationship between the different category groups uncovered in the previous two phases. The first two phases of the analysis had shown what elements seemed to be important to the activity of collaborative information seeking. However, the previous phases of the analysis had not shown how the different elements of collaborative information seeking interacted. Selective coding was performed on the categories that emerged out of the previous phases of the analysis. Selective coding specifically seeks to identify the relationships between categories. During selective coding categories are combined by the cause and affect paradigm. This paradigm was described in Chapter 4, and illustrated by Figure 8.

The first relationships found within the data, describe the relationship between the representatives, the context in which the representatives exists, and the roles and patterns that may adopt. The following two figures, (Figures 9 and 10) illustrate these relationships.

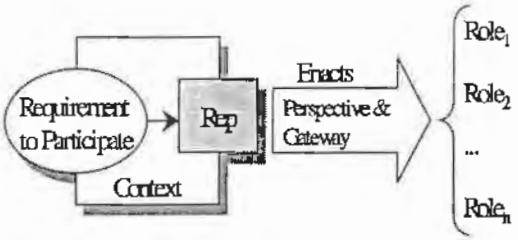

Figure 9. Relationship between Representative, Context and Roles.

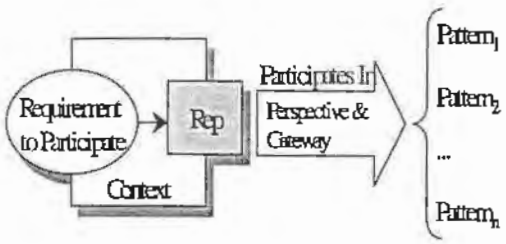

Figure 10. Relationship between Representatives, Context and Patterns.

As shown in Figures 9 and 10, representatives (denoted by *Rep* in the figures) were driven by their requirement to participate. In most instances, the requirement to participate was a directive handed down by a supervisor. This requirement acted as the initial causal condition for their activity. As shown in Figures 9 and 10, representatives are drawn from specific contexts. As representatives move to enact a role (Figure 9), or participate in a pattern (Figure 10), they bring with them their context's perspective and gateway.

This stage of the analysis also uncovered a relationship between the information seeking context, the different roles and patterns, and the representatives. This relationship is shown in Figure 11.

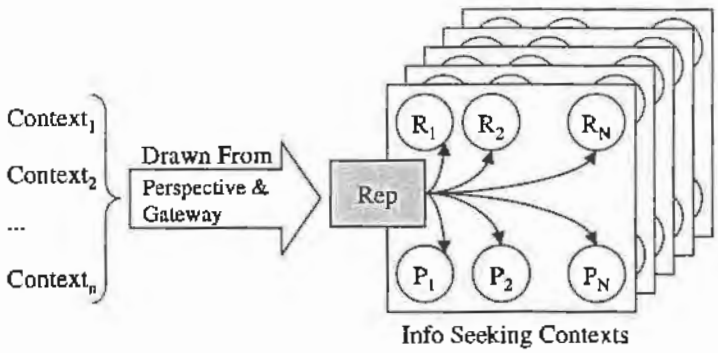

Figure 11. Relationship between Representatives, Roles, Patterns and Context.

As shown in Figure 11, representatives (denoted by *Rep* in the figure) are drawn from a number of different organisational contexts to work within the information seeking context. As they move from their organisational context they bring a specific perspective and a gateway. They enact or participate in any number of different roles

(denoted by R_x in Figure 11), or any number of patterns (denoted by P_x in Figure 11). These roles and patterns exist within the information seeking context.

The relationships uncovered during the selective coding activity were used as the starting point for the final step in this phase of the analysis, the building of the analytical story. As described in Chapter 4, the analytical story of the phenomenon describes the phenomenon under study in terms of its categories and the relationships between those categories. As is the nature of Grounded Theory development, the process of moving from data to final theory or model is an iterative process, with data being examined and re-examined many times as the details of the model emerge. Several different attempts at building the analytical story were tried. Each attempt was compared against the data to ensure it really captured the activity of collaborative information seeking as performed by the C2S Study Working Group. The final analytical story, in the form of a model of collaborative information seeking, is described in the next chapter.

Once the analysis has moved to the point where the analytical story of the phenomena under study has emerged and has been described, Strauss and Corbin (1990) advocates the use of sampling within different context to add richness and generality to the model. Strauss and Corbin (1990) describe sampling, as a way of building a more general theory, a theory that is applicable in a wide range of situations.

However, sampling of the model of collaborative information seeking within the C2S Study Working Groups was not done. The scope and constraints of this work prevented the sampling of the model within in different contexts. Thus the model developed and presented in this thesis, is a model of collaborative information seeking within the specific C2S Study Working Group domain, rather then being a model of collaborative information seeking in general.

5.3 Summary

This chapter described how the data was collected and analysed for the development of the model of collaborative information seeking within the C2S Study Working Group. Data was collected from the C2S Study Working Group's meeting minutes as well as from interviews with five of the C2S Study participants, and was analysed using the Grounded Theory methodology.

Data collection and analysis was divided into three distinct phases. Phase One focused on coding the meeting minutes, and building an understanding of who performed what activities during the collaborative information seeking activity. Phase Two included the first round of interviews with Working Group participants. This phase focused on building an understanding of why the various Working Group participants acted as they did. The final phase, Phase Three, identified the relationships between the various elements uncovered during the previous phases, and developed the analytical story, in the form of the model of collaborative information seeking.

The final model of collaborative information seeking within the C2S Working Group is described in the next chapter.

6 Modelling Collaborative Information Seeking

As shown previously, research into information seeking has focused primarily on singular and distributed information seeking, with little work being done in examining collaborative information seeking (the differences between singular, distributed and collaborative information seeking are described in Chapter 3). This chapter builds a model of the collaborative information seeking activities found within the C2S Study Working Group. This model was built from a Grounded Theory analysis of the minutes of the Working Group meetings, as well as interviews with working group participants.

Building on the discussion of Chapter 5, this chapter begins by presenting an overview of the collaborative information seeking model, and its three core components, namely, the roles, the patterns and the contexts in which the roles and patterns exist. Each of these components is then described in detail in following sections, and related back to the study domain. The model of collaborative information seeking developed and presented in this chapter is built on an analysis of collaborative information seeking as performed by the C2S Study Working Group. As such, the model is limited to only describing collaborative information seeking as it existed within the C2S Study Working Group. This limitation and other limitations of model of collaborative information seeking described in Section 7.2 in the final chapter.

6.1 Overview of Collaborative Information Seeking

As shown in Chapter 5, collaborative information seeking can be seen as consisting of three main elements, namely, the roles, the patterns and the contexts in which the roles and patterns exist. At its essence, then, collaborative information seeking can be seen as the interactions of a group of representatives, each adopting one or more information seeking roles. These roles and the interactions between them can be seen as existing within a context. The collection of actions, interactions and behaviours clustering together can be described as an information seeking pattern. These essential elements of collaborative information seeking, and the relationships between them can be seen in Figure 12.

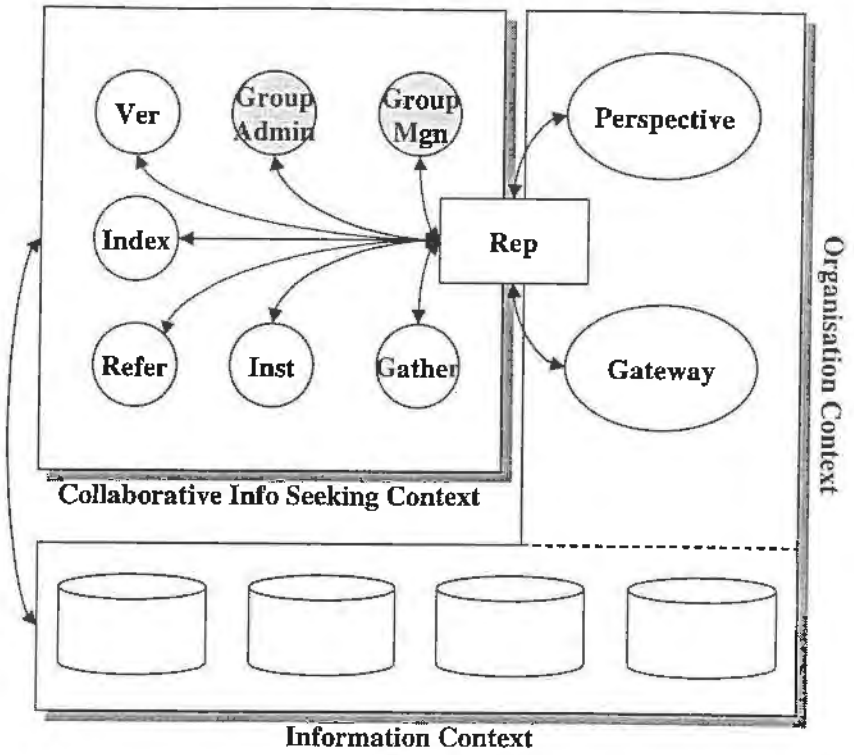

Figure 12. Collaborative Information Seeking.

Within this model of collaborative information seeking, roles can be seen as grouping together the behaviours, actions and responsibilities group members have and perform. Within this model of collaborative information seeking, roles are both formally assigned, as is the case with the group manager role, or the group administrator role, as well as being assigned or adopted by group members through both explicit and tacit negotiation.

Roles are enacted by representatives, and as shown in Figure 12, representatives are drawn from an organisational context. A role describes a group of behaviours, actions and responsibilities that group members adopt. As described in Section 3.2 Groups and Group Work, a group member's roles may change over time. Group members may have multiple roles, or several group members may all have the same role. As will be discussed later in this section, when adopting any one of the five information seeking roles or two group administration roles, representatives bring with them their organisational context. This organisational context affects the way the representatives will enact the different roles.

As shown in Figure 12, there are five information seeking roles that each representative may adopt. These are:

- Information Referrer (denoted by Refer in Figure 12)
- Information Gatherer (denoted by Gather in Figure 12)
- Information Verifier (denoted by Ver in Figure 12)
- Information Seeking Instigator (denoted by Inst in Figure 12)
- Information Index/Abstract (denoted by Index in Figure 12)

Two additional administrative roles are also important to the collaborative information seeking process. These are:

- Group Administrator (denoted by Group Admin in Figure 12)
- Group Manager (denoted by Group Mgn in Figure 12)

Both these administrative roles are concerned with the management of the collaborative information seeking group.

The second major element of collaborative information seeking found within the C2S Study Working Group is the context in which the different interactions take place. As discussed in Chapter 5, context is used to mean a collection of events, histories, culture, knowledge and understanding, which exist together at a point in time. For example, the collaborative information seeking context, (the C2S Study Working Group) describes what is collectively known, understood, felt, and believed, by group members, as well as the group norms, social rules and structures that operate within the group.

As shown in Figure 12, collaborative information seeking can be seen as being affected by three different contexts, the collaborative information seeking context, the information context and the organisational context. The collaborative information seeking context is where the collaborative activity of information seeking takes place. This context is occupied by many representatives (denoted by Rep in Figure 12), adopting one or more collaborative information seeking roles at any point in time.

The second context, the organisational context, describes where each representative is drawn from. As members of an organisation context, each representative brings with

them part of their organisational context to the collaborative information seeking activities. The context they bring can best be described as their organisational perspective and organisational gateway. The representative's organisational perspective and organisational gateway influence and affect how each representative performs any of the roles they assume within the collaborative information seeking context. These are described in detail in the following section.

The final context, the information context, contains the information that is sought by the collaborative information seekers. As shown in Figure 12, there is often a very tight relationship between the information and organisational context.

The final element of the collaborative information seeking activity, as found with the C2S Study Working Group, is the different information seeking patterns. Information seeking patterns describe collections of actions, interactions and behaviours which cluster together to form the information seeking activity. Several patterns were identified in the data, these include:

- Seeking by Provocation
- Information Seeking by Recommendation
- Direct Questioning
- Advertising Representation

Each of the three core components of the collaborative information seeking model, namely, the roles, the patterns and the contexts, are described in more detail in the following sections.

6.2 Context and Representatives

As shown in Figure 12, context is an important part of the model of collaborative information seeking described in this chapter. Context not only represents where activities take place, as in the collaborative information seeking context, but also where the representatives who enact the different information seeking roles are drawn from. As discussed previously in Chapter 5, context describes the collection of events, histories, culture, knowledge, and understanding, which exist together at a point in time, in which actions occur or in which people exist (Dervin 1996; Sonnenwald 1999).

Within the C2S Study Working Group, three different contexts emerged from the data, these were, the collaborative information seeking context, the organisational context, and the information context.

The first context found within the collected data was the collaborative information seeking context. As discussed previously in Chapter 3, groups can be seen as complete entities, with their own knowledge, norms, beliefs, culture, and other group properties. The collaborative information seeking context, then, captures what is collectively known, understood, felt and believed, as well as the history and precedents, of the group, as well as the group norms, social rules and social structures that were developed and maintained within the C2S Study Working Group. It is within this context that the information seeking activities take place. These activities are affected by the properties of the collaborative information seeking context, which exists at any point in time.

The second context, the organisational context, describes where each representative is drawn from. Each part of the organisation has its own important issues, its own perspective, its own knowledge, and other important factors. As members of an organisation context, each representative brings with them part of their organisational context to the collaborative information seeking activities. The context they bring can be seen as their organisational perspective and organisational gateway. The representative's organisational perspective and gateway influence and affect how each representative performs any of the roles they enact within the collaborative information seeking context. Organisational perspective and gateway are described later in this section.

The final context important to the collaborative information seeking activity is the information context. The information context describes the context in which the information exists. It describes the norms, rules, expectations, approaches, and precedents that exist for the information, and the information sources within the context. As shown in Figure 12, the information context is tightly related to the organisational context, and can be seen as almost a subset of the organisational context. When seen in this way, the information context will share many contextual properties with the organisational context, and the information held within the information context will often be created by the organisational context.

As discussed in Chapter 5, the concept of a representative is used to described individuals who move from one context to another context. Within the model of collaborative information seeking described in this chapter, representatives are defined as individuals drawn from various parts of the organisation to work together within C2S Study Working Group. As shown above in Figure 12 representatives played a central role in the collaborative information seeking activity, by enacting the different information seeking and different management roles within the collaborative information seeking group. Into these different roles, the representative brought important elements of the parts of the organisation they were drawn from. The following extract from S3, echoes this description of representatives:

> They obviously wear the hat of the organisation they're coming from so whether you like the individual or not there's a hat of whether you like them or not or whether you can relate to them. There's the hat of what do they contribute to the intellectual debate around the working group and there's the hat they wear in an organisational sense where you may not like them, and may not think they're very good but actually they're the person that you need to have the conduit through to the organisation (S3 263-269).

Group members within the C2S Study Working Group acted not only as Working Group members, by enacting the different roles, and performing the tasks of the Working Group, but they also acted as representatives of their part of the organisation within the Working Group. That is, they brought parts of their organisational context, in the form of their organisational gateway and organisational perspective, into the collaborative information seeking context. The organisational perspective and gateway brought to the different information seeking roles by the representatives, influences the way they perform the different information seeking roles, and the types of contributions they make. When enacting an information seeking role, representatives bring the collection of events, histories, culture, knowledge, and understanding, present within their organisational context to the collaborative information seeking context.

The organisational perspective brought to the information seeking roles by the representatives describes how the representative sees the world, and what elements they see as being important. The perspective a representative has is very important when understanding information seeking. Many of the representatives interviewed were very conscious of their perspectives, and how their perspectives influenced how they

performed the different collaborative information seeking roles. S1, for example, was not only very conscious of the perspective he brought to the collaborative information seeking context, but was also very conscious of the perspective brought by other representatives (S1 64-64, 222-231). This is reiterate by S3. He was not only deliberate in the perspective he brought, but also aware of the perspective other representatives brought, and the influence the perspectives the different representatives had in shaping the final out come (S3 9-14, 127-149).

As shown in Figure 12, the second organisational element that representatives brought to the different information seeking roles is their organisational gateway. An organisational gateway can be seen as a two way connection, or conduit, from the collaborative information seeking context into the part of the organisational context the representative is drawn from. The two way nature of a gateway means that the representatives were not only representing their organisational context within the collaborative information seeking context, but were also representing the collaborative information seeking context back to their organisation. Study participants often described this as being an *in* into the organisation represented by the gateway. The following extract from D2 illustrates this well.

> Early on we relied almost entirely on them being our eyes and ears into the environments we were looking at (D2 158-159).

D1 echoes this view of the different perspectives that the different representatives brought to the working group. D1 described the different service perspectives the representatives had as being useful in knowing which representatives would be likely to answer specific questions, or have access to specific information (D1 249-269). D2 shares this view. For D2, the representatives represented a source of contacts and an index into a particular area of the organisation, or a particular work domain (D2 62-76).

For collaborative information seeking, the organisational gateway brings important influences into the five collaborative information seeking roles. The flow from the collaborative information context into the organisational context forms an important part of the Information Referrer role. The current and planned information seeking needs and the general information interests of the collaborative information seeking context flow through the organisational gateway back into the organisational context.

This flow of information needs and interests will often form the basis for the referral of unsolicited information from the organisational context into the collaborative information seeking context. S2, for example, is very conscious of being able to contribute to the information requirement of the Working Group, and participating in the analysis of the gathered information. S2 is also very conscious of ensuring his part of the organisation is fully aware of the work of the C2S Study, and any potential impacts it may have (S2 93-117). This role and the impact of the representative's organisational gateway are described in more detail in Section 6.3.

The connection between the organisational context and the collaborative information seeking context supports the information index/abstracters role. The information indexer/abstracter role, described in detail later in Section 6.3.7, describes how representatives act as indexes for information sources within their areas. The connection between the organisational context in the collaborative information seeking context seems to support this role.

6.3 Collaborative Information Seeking Roles

As discussed in Chapter 3, roles describe behaviours, actions and responsibilities that group members have and perform (Shaw 1981). Roles are assigned or enacted by individual group members, and each group member may have one ore more roles within a group. It is important to remember that roles define activities, not people, and that individuals may change roles throughout the life of the group. In many ways, the understanding of roles performed by information seekers working collaboratively is analogous to the behavioural roles developed by Ellis (1989) and the information seeking personalties developed by Palmer (1991) and Bonner, et al. (1998).

Roles also affect the way an individual will interact with other members of the information seeking group, as well as with the context in which the information seeking exists.

Seven roles were identified within the Working Group. Of the seven roles identified, five can be seen as directly contributing to the collaborative information seeking activity, with the remaining two being responsible for the management and

administration of the group. Each of the roles is described in detail in the following sections.

6.3.1 Group Administrator

The group administrator is purely an administrative role, responsible for providing administrative support to the Working Group. While not directly responsible for seeking information, the group administrator role is often responsible for organising and holding the information gathered, as well as organising many of the formal and informal parts of the group's work. Within the C2S Study Working Group the group administrator role was divided between various group members.

The following extract from D2 describes the role and the responsibilities of the group administrator.

> The other role that M_____ played was almost like information tallying. She was very orderly, and she catalogued, she had this set up where all the minutes were kept. So that was vital. I mean trying to do that in retrospect would have been hard. Then we could find things. We'd gathered a lot of stuff (D2 175-178).

Within the Working Group, the group administrator role seemed to encompass the following activities:

- Cataloguing and organising collected information (D2 175-178)
- Keeping minutes of the meetings
- Scheduling meetings
- Distributing collected information

6.3.2 Group Manager

While not directly an information seeking role, the group manager role was responsible for managing the Working Group. One of the most important functions of this role seemed to be to keep the momentum of the work, as well as keeping the group functioning. The following extract from D1 illustrates her perception of herself within the group manager role.

> My main motivation in terms of the working group was to keep it working. To keep people attending. To keep them working with the team, to keep them well informed. To get them to become part of the analysis process, to feel as though they owned the analysis (D1 97-100).

This view is echoed by D2 when describing her perception of the role of the group manager. For D2 the group manager role was responsible for ensuring the group's work maintained its momentum, as well as ensuring disputes and problems were resolved (D2 171-175).

Another responsibility of the group manager was to deal with recalcitrant group members. Throughout the life of the C2S Study, there were several instances of group members being unable or unwilling to provide the information requested of them. The group manager role then became responsible for finding ways to resolve these problems.

For example, D1 and D2 describe the key information seeking problem encountered during the progression of the C2S Study was the reluctance of one Working Group representative to provided needed information. This Working Group member was the only available representative for a specific part of the organisation. His unwillingness to provide the needed information had a serious impact on the work of the Working Group. As discussed by D1 and D2, this problem was addressed by working around the representative by employing a contractor to gather the needed information (D1 45-61; D2 200-220).

As with the representatives involved within the collaborative information seeking context (and described in Section 6.2) the group manager role also acted as a gateway into the wider organisation, especially the higher levels of management within the organisation. The group manager role can be seen as representing the C2S Study Working Group to the wider organisation, as well as, representing the wider organisation to the C2S Study Working Group. This can be seen in the Working Group minutes, were the group manager role reports the progress of the C2S Study to higher organisation management (in the form of the steering group). The group manager then is responsible for representing the Working Group to the higher levels of management. The reverse of this flow is also present. That is where the group manager represents the

views and opinions of the organisation's higher management (in the form of the steering group) to the C2S Study Working Group. This is well described by D1, when he described the group manager's role as one of coordinating the C2S Study with the greater defence organisation (D1 239-241).

6.3.3 Information Referrer

As shown in Figure 12, the information referrer is the first of the five collaborative information seeking roles. The main function of this role seems to be to direct unsolicited information to members of the collaborative information context. The following extract from S2 describes his actions as he acted within the role of an information referrer.

> ...I'd run a bit of a filter over it and if it was potentially [useful I would send it]. In the back of your mind most of the working groups were happening fairly frequently, I think fortnightly or whatever, you sort of had that awareness (S2 267-269).

For S2, the decision that some information he had come across would be useful to someone else was based on his perception of the information needs of the person he intended forwarding it to. As a counterpoint, the following extract from D1, describing her information seeking behaviours, and illustrates the effect of the information referrer role.

> Most of it was opportunistic, I'd be talking to somebody and they'd suddenly say 'oh I must send you that document' or 'I've got something here' (D1 7-9).

The question the extract from D1 raises is how do representatives acting in the role of the information referrer learn about the existence of the information seeker, and the likely information interests and needs the information seeker may have. The extract from D1 hints at how this may be achieved; through some kind of interaction and/or advertising information interests and/or needs.

As described in the previous section, when representatives adopt any of the five information seeking roles, they bring with them their organisational perspective and organisational gateway. When acting as an information referrer, representatives make use of their gateway back into the organisation. Through this gateway, the

representative acting as an information referrer is able to advertise interest in particular kinds of information.

Advertising an information need is often done implicitly. This is illustrated by the above extract from D1, and echoed by other Working Group participants. For example, D2 describes a similar process. She found that Working Group members would often forward her unsolicited information, or bring to Working Group meetings information they felt might be useful to the work of the group (D2 222-248). For S1, the activity of advertising an information need to a potential information referrer was a haphazard, almost random activity. He describes the activity as a social one, built primarily on personal contacts, and interactions with other organisational members (S1 67-99).

As well as implicitly advertising an interest in particular information though interactions as described above, advertisement of information interest can also be performed explicitly and purposefully, as described in the following extract from S3.

> You know you get 60 emails in a day when you're away from work. I tend to try and cultivate, I'm still doing it, cultivating information sources. I'm trying to let people know what I'm interested in and what directions I want to be going so they can do a bit of self filtering before they send it to me, but realising that most of the filtering has to be at my end, but it's easier to chuck something out in the filter than not having it imported in the first instance (S3 244-250).

The above extract from S3 illustrates a very explicit and purposeful form of advertising information interests and information needs.

6.3.4 Information Gatherer

The information gatherer role describes the role representatives enact when specifically seeking and gathering information. In many ways, this role is well described by the existing literature on singular information seeking. This role is tightly coupled with the information seeking instigator role described later in Section 6.3.6.

The information gatherer role is often found within the minutes of the Working Group meetings, where representatives are assigned an information gathering task. Representatives may be assigned the information gatherer role because of the

organisational perspective or organisational gateway they can bring to the role. Or, they may be assigned the information gatherer role because of some previous referrer or indexer/abstracter role they have performed, or because they have advertised their representation of specific information, or information sources. The pattern of advertisement is described later in Section 6.4.4.

Within the collaborative information seeking context, a representative acting in the role of an information gather may be assigned or volunteer for an information gathering task. But when the representative *moves* back to their organisational context, the representative may pass the information seeking task to a subordinate, or expert information seeker, within their organisational context. In extreme cases of phenomenon the information seeking request may pass through several people in this way.

When information seeking requests are passed along like this, the context that created them is seldom passed on as part of the request. The person actually performing the information seeking request, that is gathering the information, is performing it without understanding the context that created the information need. D1 describes this as "Chinese Whispers", where information requests given to a Working Group member are passed through the organisation until they reach someone able to satisfy the requests. As D1 points out, this often gives poor results because the person fulfilling the requests is not passed the context and reason behind the request (D1 482-486). This description of the movement of information requests is echoed by D2 (D2 89-98).

6.3.5 Information Verifiers

The main role of the information verifier is to validate the gathered information. As with the other information seeking roles described within this model, the role of information verifier is enacted by representatives, and as shown in Figure 12, each of the representatives brings with them their organisational perspective and gateway into the information verifier role.

Within the C2S Study Working Group, all the information that found its way into the C2S Study Working Group was verified. There seemed to be little difference in the way information gathered from different information sources, or information gathered

because of direct information requests, or through unsolicited information referrals, was treated.

Verification of the information gathered seemed to focus on several areas. The first was the accuracy and the completeness of the information gathered. The following extract from D2 describes this type of verification.

> Checking. Checking that it was valid, things that I got, that I wasn't happy with. Revisiting people. Digging, doing more digging when there was insufficient stuff supplied. And then I had to bring it all together and send it back....Firstly? If it passed that test [of being sensible, readable, etc], but not always...it didn't...to say if anything was even slightly contentious I'd try and check it from someone else (D2 140-153).

A second, far more implicit form of information validation and verification, was also found within the Working Group. The following extract from S3 describes this more tacit form of information validation and verification.

> Bringing in our wealth of experience to tease out some things. I mean I was deliberately controversial at times. I'd actually throw a pebble in the water if you like and argue about something and turn around and argue back again the other way because I felt that we couldn't just agree on something at face value. We really needed to poke it and tease it and sort of pull it around a little bit (S3 158-163).

As the extract from S3 illustrates, this tacit form of information validation and verification was more like a type of peer review, where the information gathered was not only checked for its completeness and accuracy, but also its validity and quality. As the extract from S3 illustrates, the organisational perspective and the organisational gateway the representatives bring when adopting the role of the information verifier is a vital part of the information verification role.

A similar approach to information verification and validation is described by S2. He not only sees verification and validation of the accuracy and quality of the information, but also how well it can be understood, and how useful and applicable the information ultimately is (S2 177-191).

This process of verifying the accuracy and completeness of information gathered can be found within the meetings minutes, where Working Group participants would discusses the relevance, and the usefulness of the information gathered to solving the problems facing the C2S Study.

6.3.6 Information Seeking Instigator

The information seeking instigator role describes the role adopted by representatives when tasking information gatherers to gather specific information. The following extract from D1 describes the role of the information instigator well.

> ... I'd initiate the information seeking and monitor it in terms of will we actually get the document we seek and if we didn't get them then I'd seek them through other paths. Or stepping in myself if someone hadn't managed to get hold of a document (D1 111-114).

As the above extract from D1 illustrates, the information instigator role can generally be seen as starting the information seeking activity by identifying the initial information need. This is implicitly a part of D1's description of the information seeking instigator's role. Once the initial need for information has been identified, the information instigator will then task an information gatherer to gather the needed information. The role of the instigator then becomes one of monitoring the information gathering activity, and deciding when the information gathered satisfies the information need. This is reiterated by D1 later in the interview (D1134-140).

For D2, the task of following information requests, and ensuring that the representative assigned the information requests fully understands what is needed, and how the information needed fits within the already gathered information, is an important part of the information seeking instigator role (D2 254-275). This is echoed by S3. He described the process of focusing and articulating the information need as being an important part of the information seeking instigator role (S3 155-158).

As described in the literature review (in Chapter 2), information seeking can be seen as beginning within a state of information need, and ending in a state of information satisfaction. Once the state of information need has been identified by information

seekers, information seekers move through several cognitive stages of identifying, refining, and articulating their information needs.

The following extract from D1 illustrates how this process of identifying an information need, and the articulation of information needs occurred for the information seeking instigator role.

> Well a lot of it was talked about during the working group meetings. And so in working group meetings everyone can talk about who would be the most appropriate person to go and get information. And I was quite surprised in those working group meetings how people instinctively knew that they were the right person. But that could have been purely due to their position in the organisation, but it is my patch and I'll find that out and I'll find that out while some of them who were around the table immediately knew that they had access to that documentation (D1 21-28).

As this extract shows, discussions, negotiations, and a shared sense of what was known and what information is needed was developed and maintained by the Working Group. This is described in more detail in the next section, Section 6.4, dealing with information seeking patterns.

Another important element of this role is the relationships between the information seeking instigator, and the information gatherers, and in particular the trust, and shared understanding and shared language between them. In this case, trust is used to describe the past experiences between information seeking instigators and information gatherers. Over time, the information seeking instigator may build up *trust* in the information gatherers' ability to gather quality information. Alternatively, over time the information seeking instigator may build up distrust with the information gatherers' ability to gather quality information.

This is well described by D1. She found that she placed different levels of trust on different Working Group participants. She found she was less likely to verify or validate the information gathered by some one she had worked with before, and had built a level of understanding with, then someone she had not worked with before (D1 178-205).

6.3.7 Information Indexer/Abstracter

The final collaborative information seeking role is that of the information indexer/abstracter. This role is analogous to the role of a bibliography system, or an indexing or abstracting service for traditional information sources. As with more traditional index/abstract services, this role provides pointers to information sources (traditional sources or people acting as information sources) on specific areas or topics. The following extract from D2 captures the function of the information index/abstract role.

> The only way to find that out was through the members of the working group or through other contacts that we had at previous operations. I knew a couple from [previous work] because we knew that they were doing this because we had sat in and watched them, so we said to them we want to get information on this, and they would say 'Oh such and such is doing that' or 'he's reviewing this at the moment or he is re-writing the new plans, so there was that and the things that we didn't know or we didn't know how to get, we had to rely on the environmental representative like the Navy guy who would know and then he would have to know who knew it. If he didn't know he would have to go and find out who knew and then he would give us the name and then we would pay these peoples visits. And then ... so it was usually the person to person contact (D2 58-68).

The above extract from D2 illustrates the responsibilities of the information indexer/abstracter. In general, the information indexer/abstracter was seen as some one able to identify and provide pointers to information on a specific topic. Generally the information indexer/abstracter was likely to provide pointers to people they felt had direct access to the information, or were able to provide better pointers to the information.

The above extract from D2 also raises two important questions. The first is how does the information seeker learn of the existence of the information indexer/abstracter. And the second is; how does the information indexer/abstracter learn about the existence of information.

As the extract from D2 illustrates, information seekers generally learn about the information indexer/abstracter through interactions. Within the Working Group

information seekers, like D2, relied on past experiences, as well as relying on interactions and discussions during Working Group meetings, where likely information indexer/abstracter would be suggested and discussed by all representatives. This view is echoed by D1. She also described Working Group members, acting in the role of information indexer/abstracter, as being very aware of what areas they should be responsible for, and what areas other participants should be responsible for (D1 23-28).

The second question, how does the information indexer/abstracter learn about what information is available, can be answered by looking again at the gateways and perspectives the information indexer/abstracter brings to the role they enact. As discussed previously, when acting in any of the collaborative information seeking roles, representatives bring their organisational perspective and organisational gateway to the role. This is also evident when acting in the role of the information indexer/abstracter. Within this role, the representative's organisational perspective and organisational gateway affect what information they are likely to know about, or be able to recommend.

For all the participants, their current and past organisational perspectives and gateways affect what information they felt they were able to act as an information indexer/abstracter for. S3 describes how his ability to act as an information indexer/abstracter depended not only on his current organisational perspective and gateway, but also his past placements within the organisation (S3 9-19). This view is echoed by S2. For him, his personal knowledge and experience within the organisation defines what he is able to act as an information indexer/abstracter for (S2 7-18).

6.4 Information Seeking Patterns

This section describes some of the main information seeking patterns found within the C2S Study Working Group. Within this model, the term information seeking patterns is used to describe groupings of information seeking behaviour that appear frequently within the collected data. Information seeking patterns describe how the Working Group members can be seen to work together to perform the various actions of collaborative information seeking. The information seeking patterns show how the contexts and roles, work together to actually gather information.

The following sections describe the major information seeking patterns found within the collected data.

6.4.1 Seeking by Provocation

One of the more obvious information seeking patterns which emerge repeatedly out of the collected data is information seeking by provocation pattern. The following extract from D1 describes her perspective of this information seeking pattern.

> But I found just by presenting a few slides, it would not only provide some focus for the discussion, it would give me a map to navigate by. So if anybody said anything I was mentally tying it back to something back on the diagram and so then I found it much much easier then to look at what actions had to be taken in order to move that diagram forward or to move that subject matter forward. ... But I found those were very useful as a third party, not greatly owned by DSTO but purely to provoke discussion. Quite willing for people to look at them. So it didn't cause too much antagonism. And it I think it also permitted discussion to be ... or to take place in convivial environment. It often happened but I found it a very useful technique and I've used it elsewhere (D1 256-370).

The main elements of this pattern are described in Table 9.

Initial Provocation	• Presentation of what is currently known/understood by Information Seeking Instigator
Group Discussion	• Social Construction of meaning by Working Group • Additional information references added by the information indexer/abstracter
Tasking of Information Seeking or analysis	• Information Gatherer is tasked or volunteers • Potential input from Information Referrer some time later

Table 9. Elements of Information Seeking by Provocation.

As illustrated in Table 9, the information seeking by provocation pattern generally seems to take the following form. Initially there is some type of provocation levelled at the collaborative information seeking group. Generally, this provocation seems to be a currently understood state of knowing that one or more members of the Working Group has. This presentation is normally made by the information seeking instigator.

The Working Group participants, acting as representatives, discuss the issues. Representatives draw on their organisational perspective and organisational gateways

during these discussions. The outcome of these discussions is a group understanding of the problem, the information need, and the potential ways of satisfying this information need. Additional information sources are contributed by representatives enacting the information indexer/abstracter role.

Out of the discussion, some type of resolution emerging. This is generally in the form of one or more Working Group members adopting an information gatherer role, and being tasked, or volunteering to gather the needed information. At some later point, Working Group members acting in the role of information referrer may contribute additional information.

This pattern is also describes by D2. She adds that while the pattern was a common way for the information instigator to share what information was needed with the Working Group, it was important to follow up with personal approaches, and to ensure that all members of the Working Group were able to contribute (D2 249-275).

S2 also describes this pattern of information seeking as a *workshopping mode*, where there was a presentation, discussion, and some way to resolve the issues discussed. S2 describes this approach as being very useful, and as working very well (S2 181-198). This information seeking pattern can be found extensively within the meeting minutes.

6.4.2 Information Seeking by Recommendation

The second information seeking pattern which emerged out of the collected data was information seeking by recommendation. This pattern is tied very tightly to the information referrer role described previously. The main elements of this pattern are shown in Table 10.

Advertising interest	• The Information Seeking Instigator advertises an interest in particular information
Recommendation	• Using the Information Seeking Instigators advertisement as a guide, the information Referrer forwards unsolicited information, or references to information to the Information Seeking Instigator
Tasking of Information Seeking or analysis	• The Information Seeking Instigator may task an Information Gatherer

Table 10. Elements of Information Seeking by Recommendation.

The important characteristic of this information seeking pattern is the unsolicited nature of the information, or information references, forwarded by the information referrer. The previous information seeking pattern, information seeking by provocation, allows an information seeking instigator to specifically direct the collection of information. To explicitly describe information needs, through the provocation, and to specially task information seeking. Within the information seeking by recommendation pattern, the information seeking instigator doesn't specifically control the information collection activity, the information seeking instigator simply make their information interests known. There is no guarantee that the information needs will be satisfied. It is up to information referrers to satisfy those information needs when the opportunity arises.

As shown in Table 10, information seeking by recommendation generally begins with the advertisement of the information seeking instigator's information needs. This advertisement may take the form of some type of formal presentation of information needs, or more commonly, through informal discussion and interaction between the information seeking instigator and potential information referrers. This is very well described by S1. For him, social interaction is at the heart of the information referral pattern. It is through social interactions that he advertises his information needs to potential information referrers (S1 71-117).

The advertisement of information interests then, sensitises potential information referrers to the likely information interests of the information seeking instigator. Using this advertisement as a guide, information referrers will then forward information they encounter and feel may satisfy the information seeking instigator's information needs to the information seeking instigator.

As shown in Table 10, this information seeking pattern may also include some type of follow up activity, where the information seeking instigator may task the information referrer, or another representative with gathering the additional information from the referred source, or to deal with the information forwarded by the information referrer.

Descriptions of this information seeking pattern can be found in the interviews with Working Group participants. D1, for example describes this pattern in detail, when she describes how she became the focal point for the C2S Study Working Group. This was her advertisement of information interest. She found information referrers would then

forward information to her, based on their understanding of the information needs of the C2S Study (D1 151-177). D2 echoes this. She also notes that once you have advertised your information needs or interests to an individual or a group, she found that you often become a part of their information referral network (D2 227-234).

This pattern can be found repeatedly throughout the meeting minutes. Generally, Working Group members will provide information or references to information, which they think might be useful for the Working Group to consider. These referrals can generally be found at the end of the meeting minutes, as a part of the any other business section. For example, in meeting 24, a Working Group member recommends following up an upcoming defence exercise. The advertisement of this information need is the Working Groups' focus on using defence scenarios as a way of evaluating defence capability. The progression of the defence exercise may provide the Working Group with additional insights into the defence process. In this case, the Working Group member making this referral, that is, acting in the role of the information Referrer, was assigned the task of gathering information on this exercise.

In a following meeting, meeting 34, a working group member refers the group to the proceedings of a conference. This was an Air Force conference, which covered many of the conceptual issues related to Command and Control. The advertisement of this information need again came from the Working Groups focus at the time. However, in this case, the information referrer wasn't assigned with gathering this information, instead another Working Group member was assigned the information gatherer role for this information.

6.4.3 Direct Questioning

The direct questioning information seeking pattern is the most intuitive of all the information seeking patterns discussed. This pattern describes a form of information seeking which is driven by the information seeking instigator. The main elements of this pattern are shown in Table 11.

Instigator Questions	• The Information Seeking Instigator decides information needs
Questions formalised	• Information needs formalised in some way.
Questions presented to representatives	• Representatives are selected based on their organisational gateway, and organisational perspective, that is what part of the organisation they represent, and hence what information they represent.
Answers drawn by representatives	• Using their gateways, representatives find the needed information
Answers returned to the instigator or agent	• The representatives returned the needed information back to the instigator

Table 11. Elements of the Direct Questioning Pattern.

As shown in Table 11, the direct questioning information seeking pattern begins with the information instigator (as a single person, or as a group of people) directing representatives to gather specific information to satisfy a specific information need.

Initially the information seeking instigator forms an understanding of the information needs. These needs are formalised in some way so they can be communicated to potential information gatherers (this activity is well defined by the existing literature on information seeking, and can be found in Chapter 2). Once the understanding of information needs has been developed, it is put to the representatives.

As discussed previously (in Section 6.2) representatives bring with them their organisational perspective, and their organisational gateway to the different roles they enact. When information is gathered using the direct questioning information seeking pattern, representatives are selected because of what perspective they can bring to the information seeking problem, or because of the information they can access through their organisational gateway.

Representatives are selected because of their potential organisational perspective and organisational gateway. Representatives are presented with the information needs. Enacting the role of information gatherers, the representatives then gather information, which they feel best, meets the information needs of the information seeking instigator. The question of how representatives are identified as having a particular organisational perspective or a particular organisational gateway is described by the next information seeking pattern, the advertising representation, described in the next section.

The information gathered by the representatives enacting the role of the information gatherer is then returned to the information seeking instigators. It is evaluated by the information seeking instigator against the initial information needs. As shown previously in Chapter 2, the information seeking activity may end here, if the gathered information satisfied the information seeking instigator's information need, or the information seeking activity may be performed again if the gathered information doesn't satisfy the information seeking instigator's needs.

The direct questioning pattern of information seeking can be seen repeatedly through out the Working Group meeting minutes. For example, in meeting one the information seeking instigator, in the form of D1 and D2, provide the working group with a collection of tables. These tables have many blank fields, which working group members are requested to fill in. In this example, the presentation of the information need is very direct and very well defined. This was a frequently used approached and can be found in several other meetings. The articulation of information needs is not always this well defined. In meeting 16, for example, an information need is developed out of a discussion. During the discussion, the group discovers it is missing information. This information need is identified by the information seeking instigator. The information seeking instigator then tasks the working group members to gatherer information which may fill this information gap.

As discussed above, information gatherers are often selected based on their organisational perspective and organisational gateway. So they are selected based on what information they would have access to. For example, in meeting eight, specific working group members, an Army, Navy and Air Force representative, are specifically assigned with gathering specific information, identified by a description. The information needed specifically described a services (Army, Navy or Air Force) approach to particular activities. These representatives are specifically selected because of their organisational gateways and their organisational perspectives.

6.4.4 Advertising Representation

The advertising representation pattern is not so much about seeking information, as it is about providing potential paths by which to seek information. As discussed previously, when dealing with traditional information sources, there are a range of tools and

techniques for finding information and information sources, including abstracting and indexing services, bibliography systems, publishers' catalogues, and similar tools. However, when dealing with people as an information source, there are few comparable tools and methods. The advertising representation pattern was the main method identified within the collected data, which provided information seekers with an awareness of the potential information, and information sources a representative could access. The two main elements of this pattern are described Table 12.

Representatives advertises their organisational perspective and gateway	• The representative advertise their ability to provide information on a specific topic
Some type of tasking	• The representative is used, immediately, or some time later as an Information Gatherer, or Information Indexer/Abstracter.

Table 12. Elements of the Advertising Representation Pattern.

As shown in Table 12, the advertising representation pattern generally begins with some representative advertising their organisational gateway and their organisational perspective, and hence what information or information resources they can access. Organisational gateway and perspective were discussed previously in Section 6.2. The advertising representation may be done in many different ways.

Advertising representation may be done as an implicit part of the representative's organisational position, or formal organisational role. Within the Working Group, for example, representatives were explicitly assigned information seeking tasks because of their formal organisational role, or organisational position. This is well expressed by D2 where she describes how she relied on the input from working group members from the specific services to provide information from the service that they represented (D2 63-69). This can be seen in the minutes of the Working Group meetings. For example, in meeting eight, specific service representatives are specifically assigned to gather information from the service that they represent. Their organisational association, then, advertises their ability to gather information related to the part of the organisation they represent.

Representation may also be advertised as part of a formal or informal discussion between potential information gatherers and information indexers/abstracters and potential information seeking instigators. S1, for example, describes how he relied almost exclusively on informal interactions with colleagues to build an understanding of

who would be able to provide what information, that is, who would be able to act in the role of information gatherer or information indexers/abstracter (S1 71-119).

The final form of advertising representation that seemed to emerge out of the Working Group was the trading of advertisements, were working group members would suggest representatives, either members of the working group, or outside of the working group, as information gatherers or information indexers/abstracters. This is well described by D1, where she describes how working group members were able to suggest themselves or other people as being able to act as information gatherers or information indexers/abstracters for specific areas (D1 21-27). This pattern can also be seen, infrequently, within the minutes. For example in meeting seven, out of a discussion the Working Group recommends several potential information gatherers and information indexers/abstracters who may be able to gather information the Working Group needed.

6.5 Summary

This chapter presented a model of collaborative information seeking as performed by the C2S Study Work Group. As shown in Figure 12 collaborative information seeking within the C2S Study Working Group consisted of three core components, the roles, the patterns and the contexts in which the roles and patterns exist.

The roles found within the C2S Study Working Group can be seen as grouping together the behaviours, actions and responsibilities group members have and perform. Roles can be formally assigned, for example, the group manager, assigned or adopted by group members through both explicit and tacit negotiation. Within the Working Group, the following roles were identified:

Group Manager. This role was responsible for ensuring the Working Group maintained its momentum, as well as stepping in to deal with recalcitrant group members.

Group Administrator. This role performed many of the group administration functions, including taking the meeting minutes, organising and storing collected information, and scheduling Working Group meetings.

Information Referrer. The function of this role was to forward unsolicited information to members of the Working Group.

Information Gatherers. Generally tasked by the information seeking instigator, this role was generally responsible for physically gathering the information.

Information Verifiers. The main function of this role was to check the information gathered by the information gatherers, as well as the information forwarded by the information referrers.

Information Seeking Instigator. This role was responsible for tasking information gatherers to gather needed information. Once the information gatherers had been tasked, this role then became responsible for monitoring the information gathering process.

Information Indexer/Abstracter. The function of this final role was to perform the activities of an index or abstract for organisational information sources, and in particular, for people acting as information sources.

As shown in Figure 12, the second key component of the collaborative information seeking activity as performed by the C2S Study Working Group, was the different contexts in which the activities took place, or from which Working Group members were drawn. The contexts identified within the Working Group, were, the collaborative information seeking context, which described the Working Group, the organisational context, which described where the working group members were drawn from, and the information context, which described where the information used by the Working Group was drawn from. As shown in Figure 12, there is a very tight relationship between the organisational context and the information context.

When adopting one of the information seeking or group administrative roles, each representative brought their organisational context into the collaborative information seeking context. This affects what they know, whom they know, what experiences they have, and ultimately, how they are able to perform the role they adopt.

The final part of the collaborative information seeking model described in this chapter was the different information seeking patterns identified. Information seeking patterns

describe events and activities that clustered together again and again within the minutes collected. They show how the different information seeking roles interacted to actually perform the activity of information seeking. The following patterns were identified.

Seeking by Provocation. This pattern described a common approach to information seeking used within the Working Group. This pattern would generally start with some initial provocation. This provocation would be followed by a group discussion. Out of the group discussion, the group would identify any holes in its understanding of the topic discussed. To satisfy these information needs, information gatherers would be tasked with collecting information.

Information Seeking by Recommendation. This pattern would generally begin with an information seeking instigator advertising some type of information need. Following this advertisement, information referrers may, often some time later, forward information they feel may satisfy the information seeking instigators information needs. The difference between this pattern and the previous pattern is the unsolicited nature of the information forwarded by the information referrer.

Direct Questioning. This information seeking pattern generally involved the information seeking instigator directly tasking representatives to gather information. Representatives were generally selected because of their organisational gateway and their organisational perspective.

Advertising Representation. This final information seeking pattern describes how potential information seeking instigators build and maintain an awareness of potential information referrers, information gatherers and information indexer/abstracters.

7 Conclusions and Further Questions

This final chapter relates the model of collaborative information seeking developed in this thesis to the domain of information technology, and discusses the potential the model may have in the area of Information and Knowledge Management technology and Computer Supported Collaborative Work (CSCW). Following on from that is a discussion of limitations of the research presented in this thesis, as well as potential future work.

7.1 Impact on Information Technology

This section describes the impact the model and understanding of collaborative information seeking developed in this thesis may have on information technology. The potential impact is examined from two perspectives; the impact it may have in the area of Information and Knowledge Management technology and the impact it may have on Computer Supported Collaborative Work (CSCW) technology. Each perspective is described in detail in the following sections.

7.1.1 Knowledge and Information Management Technology

As shown by the model of collaborative information seeking, described in Chapter 6, when dealing with complex information held within a large organisation, information is often found through the use of interpersonal contacts. The understanding of how information seekers build and maintain their awareness of interpersonal contacts may help address the tacit knowledge problem which current information and knowledge management technology may face.

The one necessary prerequisite for current forms of information and knowledge management is that the information or knowledge they deal with is explicit, that is, the information or knowledge they manage can be independently (free from its owner or creator), expressed in some shared and recordable form. The form may vary from structured database records, unstructured text, graphical representations, through to production rules, or semantic networks, and so on. However, research into information and knowledge within organisations has shown that information and knowledge can also be described as tacit (McAulay, et al. 1997; Polanyi 1966). Tacit information or

knowledge, is information or knowledge which is often personal, often context-specific, hard to formulate, hard to communicate and very difficult to express in some shared, recordable form. Traditional forms of information and knowledge management may be unable to deal with this style of information or knowledge (McAulay, et al. 1997; Nonaka and Takeuchi 1995).

Research into understanding how and why people act as information sources may help address the tacit knowledge problem by looking at ways of making information which describes "who knows what" rather then "what someone knows" available. Rather then attempting to record what an individual may know (which may be difficult, if not impossible, when dealing with tacit information or knowledge), an alternative approach may be to provide pointers to people acting as information sources, who are like to hold the needed information or knowledge.

As shown by model of collaborative information seeking described in Chapter 6, information is an often found by using people enacting the roles of information referrers and information indexer/abstracters. Awareness of potential information referrers and information indexer/abstracters is built and maintained through personal contacts and interpersonal interactions, as well as through the information seeking by recommendation and the advertising representation patterns.

The information, knowledge and experience held by people enacting the roles of information referrers and information indexer/abstracters becomes a vital resource to the information and knowledge management within an organisation. However, identifying them though the use of personal contacts, and interpersonal interactions as well as through the information seeking by recommendation and the advertising representation patterns is haphazard at best, often unrepeatable, and relies on the personalities of the people involved.

One potential information and knowledge management technology that may be able to address these problems is some type of searchable information referrers and information indexer/abstracters index system. Where potential information referrers and information indexer/abstracters are identified, and the information and information sources they are likely to be able to provides references to is recorded. An information seeking instigator could then consult this index system, and find potential information referrers and

information indexer/abstracters who may be able to offer information or references to information to satisfy the information seeking instigators information needs.

A similar system was described by Harvey, et al. (1998). Their system, InfoVine, is built around user profiles. Users build a user profile, which describes their current interests, and topics they are able to provide information or expertise on. This system can be seen as implementing the advertising representation pattern described previously, and in particular, user profiles can be seen as implementing an explicit style of advertising representation. InfoVine users then can search these user profiles, looking for potential information referrers and information indexer/abstracters. The InfoVine system has been implemented within a large research and development organisation, and so far, the results look promising. However, as shown by the model of collaborative information seeking described in this thesis, advertising representation is often performed implicitly, because it forms a part of the representative's organisational position, or formal organisational role, or it may be a result of a formal or informal interaction. These important instances of advertising representation would not be captured by the InfoVine system.

A more sophisticated approach maybe to combine many different potential forms of advertising representative together. This may include, past work experience, and current organisational position, past education and professional or technical training. Past information requests for library or other information systems, current self identified information needs, interests, and the like. When combined these many different individual properties begin to build a more detailed picture of the information referrers and information indexer/abstracters potential of any individual.

7.1.2 Computer Supported Collaborative Work

Within the area of Computer Supported Collaborative Work (CSCW), the understanding provided by the collaborative information seeking model developed in this thesis may impact CSCW in several ways. The understanding of how and why people act as information sources may provide ways of building a better awareness of other organisational members, and the information, knowledge and experience they may have.

This better awareness could be used in enhance and improve the collaborative experience, by helping to establishing empathy and a rapport between physically distributed team/group members. A greater awareness of other organisational members, and the information, knowledge and experience they have may make it easier to locate expertise, knowledge and experience within an organisation (as discussed in the previous section). This may have an impact on group planning and group decision making tools.

Finally, a greater awareness of other organisational members, and the information, knowledge and experience they have may also have an affect on the design of workflow systems. Having a better understanding of organisational members may leading to workflow systems that are able to dynamically move information and tasks based on expertise, and knowledge of organisational members, rather then on static information flows.

7.2 Limitations And Future Work

A major limiting factor of the collaborative information seeking model developed and described in this thesis, is its scope. The model can only reliability be said to describe collaborative information seeking as it was performed by the C2S Study Working Group, rather then collaborative information seeking in general. As discussed by Strauss (1987) before a model can be considered a useful and substantive theory, it must be sampled and tested against data collected from a variety of domains.

The collaborative information seeking model developed and described in this thesis was only sampled and tested against the C2S Study Working Group domain, hence its applicability is limited to modelling collaborative information seeking as performed within the C2S Working Group domain. Additional work would be needed to move the model from being a model, which describes collaborative information seeking as performed by the C2S Working Group, to being a model, which described collaborative information seeking in general.

The second major limitation of the research described in this thesis was the detail and descriptions of the information seeking patterns uncovered from the collected data. While the retrospective nature of the research into the C2S Study Working Group

providing the analyst with the opportunity to examine a complete and successful example of collaborative information seeking, it also limited some aspects of the data that could be collected.

The development of the information seeking patterns depended almost completely on capturing all the subtleties of the interactions between C2S Working Group members as they perform the various collaborative information seeking activities. As discussed previously, the information seeking patterns were derived, retrospectively, from the minutes of the C2S Working Group meetings, and interviews with the C2S Working Group participants. However, the two data collection methods used failed to capture many of the subtleties of the information seeking patterns. As a result only four patterns could be reliably described. Alternative data collection method, for example an ethnographical approach performed on a live collaborative information seeking activity may provide more detailed data.

7.3 Conclusions

As discussed in Chapter 2, information seeking can be seen as encompassing all the activities needed to move from a state of information need into a state of information satisfaction. The state of information need describes information seekers who need additional information. This need for additional information may often result from external tasks or situations. These external tasks or situations will cause the information seeker to seek out additional information. After performing some type of information seeking activity (described next), information seekers can be described as moving into a state of information satisfaction. They enter this state when they have no need for additional information. This description of information seeking was illustrated in Figure 3.

The activity of moving from a state of information need into a state of information satisfaction, that is the information seeking activity, was described as consisting of several key steps, these are summarised in Table 13.

Understanding Information Need	• Create an understanding of what information is needed. • Information needs result directly, or indirectly, from the state of information need the information seeker enters.
Deciding How to Gather	• Select information sources to be used. • Select methods for interacting with the selected sources. • Selection of sources and methods uses the information seeker's awareness and experience with available information sources.
Information Gathering/Retrieval	• Physically gather the information identified as being able to satisfy the information needs.
Evaluating Information	• Evaluate the gathered information against initial information needs.

Table 13. Summary of Information Seeking Activity.

The main point made within this thesis, is that information seeking when performed by an individual and information seeking when performed by a group is different. Previous literature describing information seeking has focused primary on how individuals perform information seeking. This was discussed in detail in Chapter 3.

Chapter 3 described information seeking as existing along a continuum, ranging from singular information seeking, through distributed information seeking and into collaborative information seeking. This continuum was illustrated in Figure 6.

Singular information seeking describes information seeking performed by only one information seeker. Distributed information seeking describes information seeking which involves external agents or systems during the deciding how to gather and the information gathering/retrieval stages of the information seeking activity. During distributed information seeking, individual information seekers are still responsible for their initial movement into a state of information need, and the articulation of their information needs, as well as the evaluation of the collected information. The final type of information seeking, collaborative information seeking describes information seeking as a group activity. Collaborative information seeking can be seen as involving multiple information seekers at all stages of the information seeking activity, from the initial movement into a state of information need, through the various information seeking stages, and the final movement into the state of information satisfaction.

Chapters 5 and 6 developed and described a model of collaborative information seeking. This model was based on a retrospective, Grounded Theory analysis of a complex

collaborative information seeking activity, the Command and Control Support (C2S) Study. This model of collaborative information seeking was illustrated by Figure 12.

As shown by Figure 12, the model of collaborative information seeking consists of three components. The roles performed by different representatives. The contexts from which representatives are drawn from, or in which they work. As well as the various information seeking patterns which describe how the representatives, enacting different roles, work together to perform the information seeking activity. The different roles uncovered are summarised in Table 14.

Group Manager	• Managers the group. • Ensuring group maintains it momentum. • Deal with recalcitrant group members.
Group Administrator	• Performs group administration functions.
Information Referrer	• Responsible forwarding unsolicited information to members of the Working Group.
Information Gatherers	• Tasked by the Information Seeking Instigator. • Responsible for physically gathering the information.
Information Verifiers	• Check the information gathered by the Information Gatherers. • Check the information forwarded by the Information Referrers.
Information Seeking Instigator	• Task Information Gatherers to gather needed information. • Monitor the progress of the Information Gatherers.
Information Indexer/Abstracter	• Act as an index or abstract for organisational information sources and for people acting as information sources.

Table 14. Summary of Collaborative Information Seeking Roles.

The second component of the model of collaborative information seeking was the different contexts, in which the representatives work, or are drawn from. The different contexts important to collaborative information seeking are summarised below in Table 15.

Collaborative Information Seeking Context	• Generally described the C2S Working Group. • Contexts in which the collaborative information seeking activities exist.
Organisational Context	• Where the different representatives are drawn from. • Influenced the representatives perspective. • Provide the representatives with a gateway.
Information Context	• Where the information used by the Working Group was drawn from.

Table 15. Summary of Contexts.

The final component of the model of collaborative information seeking developed in this thesis was the different information seeking patterns. Information seeking patterns

show how the different information seeking roles interacted to perform the information seeking activity. The patterns identified are summarised in Table 16.

Seeking by Provocation	• Common approach to information seeking. • Begins with an initial provocation. • The provocation is followed by a group discussion. • From the discussion, the group would identifies gaps in its understanding. • To satisfy these gaps, Information Gatherers would be tasked with collecting information.
Information seeking by Recommendation.	• Begins with an Information Seeking Instigator advertising an information need. • Information Referrers may, as a result of this advertisement, forward information they feel may satisfy the information seeking instigators information needs. • The difference between this pattern and the Seeking by provocation pattern is the unsolicited nature of the information forwarded by the Information Referrer.
Direct Questioning.	• The Information Seeking Instigator directly tasks a representative to gather information. • Representatives are selected because of their organisational gateway and their organisational perspective or because of previous advertising of representation.
Advertising Representation.	• Information Referrers, Information Gatherers and Information Indexer/Abstracters advertise their ability to provide information of a specific type. • Information Seeking Instigators use these advertisements to task representatives to gather information.

Table 16. Summary of Information seeking Patterns.

8 Bibliography

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Appendix A. Interview Guide

The interview guide in this appendix was used for all 5 interviews. Full transcripts of the interviews can be found Appendix C. As, described in *Section 5.1.3. Interviews with Study Participants*, the interviews were semi-structured. The questions listed here were used as the starting points for the various parts of the interviews. As is the nature of the Grounded Theory the focus of the data collection activities changes as the analysis moves through the data analysis activities. As a result, the focus of the unstructured parts of the interviews did vary between interviewees.

Information Sources Used

Intro: The C2S Study gathered a lot of information of various types -- simple factual information, for example the names and descriptions of what information systems exist within a service, through to individual's experiences on exercises and operations.

- Role of people as information sources and index sources
- Discover stuff by talking with people. We learn as we interact with people
- Problems that are unique to people.
- Problems with perceptions -- we end up relying on people to do our bidding, and rely on them understanding us.

Q: When you were seeking information for the working group, what different information sources do you remember using?

Q: How do you remember learning about the existence information sources you used?

Q: What kinds of problems do you remember encountering when you needed to gather information for the study?

Q: How did/would you deal with people who are unable or unwilling to provide the information they had been asked to, or had volunteered to?

Your activities and responsibilities as a Working Group member

Intro: During the C2S Study, members of the working group were assigned or volunteered to perform a variety of different activities?

- Roles performed, and how they change.
- Chaining of activities.
- Their Perception of other peoples roles -- what do they see people doing?

Q: Thinking back to your participation in the working group, what kinds of activities do you remember performing?

Q: And what kinds of responsibilities do you remember having?

Q: Did you find that you needed to make use of people outside of the Working Group when performing the activities you were tasked with, or volunteered to perform?

Deciding what information was needed, and where it can be found

Intro: A key part of an information seeking activity is deciding what information you don't know, and what information you need to know. As well as deciding where or how the information can be found.

- Deciding what is known and not known is a decided by discussion.
- The group it self acting as the information seeker. Did it go through all the elements we associate with the cognitive elements of information seeking?
- Patten of work, and information seeking -- seeking by provocation, seeking by reference, etc.

Q: When you look back on the Working Group, how do you think it went about deciding what it didn't know, and what it needed to know?

Q: How do you remember the working group deciding where to go looking for information?

Q: How do you go about trying to elicit information from working group members?

Q: How did you see the Working Group's role in providing you with the information you needed? And how did you decide when to task the Working Group to gather the information you needed?

Appendix B. C2S Study Working Group Minutes

This appendix describes the C2S Study Working Group meeting minutes. Due to the size of the meeting minutes (over 150 pages), and issues relating to security classification of the meeting minutes, the full set of minutes could not be included. This section describes each meeting, and the minutes used.

Meeting: 1
Date: 1330 1630, Wednesday 17 April 1996
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier, DSTO (Chair)
WGCDR Peter Arnold
LTCOL Mark Lippiatt
CMDR John Collins
LTCOL Jane Glenn
Mr John O'Neill, DSTO
Mrs Moira Chin, DSTO
WGCDR Simon Ford
Mr Tom Ciesniewski
Mr Stewart Fenwick
Ms Malathi Carthigaser, DSTO
CMDR Stewart Dietrich

Meeting: 2
Date: 1330 to 1600, Wednesday 1 May 1996
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier, DSTO (Chair)
WGCDR Peter Arnold
LTCOL Steven Hosking
Mr Roger Penhale
LTCOL Mark Lippiatt
CMDR Stewart Dietrich
CMDR John Collins
Ms Malathi Carthigaser, DSTO
Mr Alan Tebb
Mr John O'Neill, DSTO
WGCDR Simon Ford

Meeting: 3
Date: 1400 to 1640, Friday 10 May 1996
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
Mr Stewart Fenwick
Mr Roger Penhale
Mrs Moira Chin, DSTO
WGCDR Simon Ford
Mr John O'Neill, DSTO
CMDR Stewart Dietrich
LTCOL Mark Lippiatt
Dr David Wood
LTCOL Steven Hosking
Ms Malathi Carthigaser, DSTO
WGCDR Peter Arnold

Meeting: 4
Date: 1400 to 1700, Monday 20 May 1996
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
Ms Malathi Carthigaser, DSTO
LTCOL Mark Lippiatt
WGCDR Peter Arnold
Mr John O'Neill, DSTO
Mr Stewart Fenwick

Mrs Moira Chin, DSTO
WGCDR Simon Ford
Mr Roger Penhale
CMDR John Collins
LTCOL Steven Hosking

Meeting: 5
Date: 1400 to 1600,Tuesday 28 May 1996
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
Dr David Wood
Ms Malathi Carthigaser, DSTO
Mrs Moira Chin, DSTO
LTCOL Mark Lippiatt
Mr Stewart Fenwick
Mr John O'Neill, DSTO
Mr Roger Penhale
WGCDR Peter Arnold
LTCOL Steven Hosking

Meeting: 6
Date: 1400 to 1645, Wednesday 12 June 1996
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
Mrs Moira Chin, DSTO
LTCOL Steven Hosking
Ms Malathi Carthigaser, DSTO
Mr Stewart Fenwick
WGCDR Peter Arnold
CMDR John Collins

Meeting: 7
Date: 1430 to 1630, Thursday 4 July 1996
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
Mr Roger Penhale
Mr John O'Neill, DSTO
CMDR Russell Baker
WGCDR Peter Arnold
Ms Malathi Carthigaser, DSTO
Mr Alan Tebb
Mrs Moira Chin, DSTO
CMDR Stewart Dietrich
CMDR John Collins
WGCDR John Matthews

Meeting: 8
Date: 1400 to 1630, Monday 29 July 1996
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
WGCDR John Matthews
CMDR Russell Baker
LTCOL Mark Lippiatt
Ms Malathi Carthigaser, DSTO
WGCDR Jim Walker
Mrs Moira Chin, DSTO
WGCDR Peter Arnold
LTCOL Steven Hosking

Meeting: 9
Date: 1400 to 1630, Tuesday 13 August 1996
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:

Dr Jennie Clothier (Chair)
Mrs Moira Chin, DSTO
Mr Andrew Gabb, DSTO
Ms Malathi Carthigaser, DSTO
Mr Stewart Fenwick
WGCDR Peter Arnold
CMDR Russell Baker
LTCOL Steven Hosking

Meeting: 10
Date: 1400 to 1600, Monday 26 August 1996
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
WGCDR Peter Arnold
Mrs Moira Chin, DSTO
Mr Roger Penhale
Mr Alan Tebb
CMDR Russell Baker
LTCOL Mark Lippiatt
Mr Stewart Fenwick
Ms Malathi Carthigaser, DSTO
Mr John O'Neill, DSTO
WGCDR Jim Walker

Meeting: 11
Date: 1400 to 1630, Wednesday 11 September 1996
Location: Fern Hill Conference Room
Minutes by: Mr John O'Neill

Attendees:
Dr Jennie Clothier (Chair)
WGCDR Peter Arnold
Mrs Moira Chin, DSTO
LTCOL Steven Hosking
Mr Alan Tebb
LTCOL Mark Lippiatt
CMDR John Collins
WGCDR Mark Toia
Mr John O'Neill, DSTO
WGCDR Jim Walker

Meeting: 12
Date: 1415 to 1625, Thursday 10 October 1996
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
Mrs Moira Chin, DSTO
WGCDR Peter Arnold
Mr Roger Penhale
Mr Stewart Fenwick
LTCOL Steven Hosking
Ms Malathi Carthigaser, DSTO
Mr John O'Neill, DSTO

Meeting: 13
Date: 1400 to 1715, Wednesday 23 October 1996
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
Mr Roger Penhale
Mrs Moira Chin, DSTO
WGCDR Peter Arnold
LTCOL Mark Lippiatt
CMDR Russell Baker
Mr Stewart Fenwick
Ms Malathi Carthigaser, DSTO
WGCDR Jim Walker

Meeting: 14
Date: 1400 to 1640, Monday 11 November 1996
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:

Dr Jennie Clothier (Chair)
Mrs Moira Chin, DSTO
WGCDR Peter Arnold
LTCOL Mark Lippiatt
CMDR Russell Baker
Mr Stewart Fenwick
Ms Malathi Carthigaser, DSTO
Mr John O'Neill, DSTO

Meeting: 15
Date: 1400 to 1600, Tuesday 3 December 1996
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:

Dr Jennie Clothier (Chair)
Mr Stewart Fenwick
WGCDR Jim Walker
WGCDR Peter Arnold
CMDR John Collins
Mr John O'Neill, DSTO
LTCOL Mark Lippiatt
Ms Malathi Carthigaser, DSTO

Meeting: 16
Date: 1400 to 1600, Wednesday 22 January 1997
Location: Fern Hill Conference Room
Minutes by: Malathi Carthigaser

Attendees:

Dr Jennie Clothier (Chair)
Mrs Moira Chin, DSTO
WGCDR Peter Arnold
LTCOL Duncan Burns
CMDR Russell Baker
Mr Stewart Fenwick
WGCDR Jim Walker
Ms Malathi Carthigaser, DSTO
CMDR John Collins
Mr Roger Penhale

Meeting: 17
Date: 1400 to 1550, Thursday 13 February 1997
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:

Dr Jennie Clothier (Chair)
Mr Chris McColl
LTCOL Simon Gould
Mrs Moira Chin, DSTO
WGCDR Peter Arnold
CMDR John Collins
Mr Stewart Fenwick
WGCDR Jim Walker
LTCOL Duncan Burns
Ms Malathi Carthigaser, DSTO
Mr Roger Penhale
LTCOL Ewart Challis

Meeting: 18
Date: 1400 to 1620, Thursday 6 March 1997
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:

Dr Jennie Clothier (Chair)
Mrs Moira Chin, DSTO
WGCDR Peter Arnold
LTCOL Simon Gould
Mr Stewart Fenwick
WGCDR Jim Walker
Ms Malathi Carthigaser, DSTO
LTCOL Ewart Challis

Meeting: 19
Date: 1400 to 1650, Wednesday 26 March 1997
Location: Fern Hill Conference Room

Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
LTCOL Ewart Challis
Mrs Moira Chin, DSTO
LTCOL Simon Gould
Mr Stewart Fenwick
WGCDR Jim Walker
Ms Malathi Carthigaser, DSTO

Meeting: 20
Date: 1400 to 1605 Wednesday 23 April 1997
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
CMDR Russell Baker
WGCDR Peter Arnold
LTCOL Ewart Challis
Mrs Moira Chin, DSTO
Mr Toby Keene
Mr Paul Prekop, DSTO
Ms Malathi Carthigaser, DSTO
Mr Roger Penhale

Meeting: 21
Date: 1400 to 1625, Tuesday 20 May 1997
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
Mr Roger Penhale
WGCDR Peter Arnold
CMDR Russell Baker
LTCOL Simon Gould
Mrs Moira Chin, DSTO
Mr Toby Keene
Ms Malathi Carthigaser, DSTO
Mr Paul Prekop, DSTO
LTCOL Duncan Burns

Meeting: 22
Date: 1400 to 1540, Wednesday 11 June 1997
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
Mrs Moira Chin, DSTO
LTCOL Simon Gould
CMDR Russell Baker
Mr Ian Culloden
LTCOL Duncan Burns
LTCOL Ewart Challis
Ms Malathi Carthigaser, DSTO
Mr Paul Prekop, DSTO
Mr Toby Keene
Mr Roger Penhale

Meeting: 23
Date: 1400 to 1630, Thursday, 10 July 1997
Location: Fern Hill Conference Room
Minutes by: MAJ Ian Culloden

Attendees:
Dr Jennie Clothier (Chair)
Mrs Moira Chin, DSTO
LTCOL Simon Gould
WGCDR Peter Arnold
LTCOL Duncan Burns
LTCOL Ewart Challis
LTCOL Tony Casey
Mr Paul Prekop, DSTO
MAJ Ian Culloden

Meeting: 24

Date: 1400 to 1510, Tuesday 5 August 1997
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
Mrs Moira Chin, DSTO
WGCDR Peter Arnold
LTCOL Ewart Challis
Mr Stewart Fenwick
WGCDR Jim Walker
Ms Malathi Carthigaser, DSTO
LTCOL Duncan Burns

Meeting: 25
Date: 1400 to 1540, Tuesday 26 August 1997
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
CMDR Tony Ladomirski
WGCDR Peter Arnold
LTCOL Simon Gould
WGCDR John Meier
Mrs Moira Chin, DSTO
Mr Roger Penhale
Mr Stewart Fenwick
Ms Malathi Carthigaser, DSTO
MAJ Ian Culloden
Mr Paul Prekop, DSTO

Meeting: 26
Date: 1400 to 1700, Thursday 18 September 1997
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
LTCOL Simon Gould
CMDR Tony Ladomirski
Mrs Moira Chin, DSTO
WGCDR John Meier
LTCOL Ewart Challis
LTCOL Tony Casey
Mr Roger Penhale
MAJ Ian Culloden
Ms Malathi Carthigaser, DSTO
Mr Paul Prekop, DSTO
LTCOL Duncan Burns

Meeting: 27
Date: 1415 to 1540, Tuesday 7 October 1997
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Mrs Moira Chin (Chair)
CMDR Tony Ladomirski
LTCOL Duncan Burns
LTCOL Simon Gould
MAJ Ian Culloden
Ms Malathi Carthigaser, DSTO
Mr Paul Prekop, DSTO

Meeting: 28
Date: 1400 to 1600, Thursday 23 October 1997
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
LTCOL Simon Gould
CMDR Tony Ladomirski
Mrs Moira Chin, DSTO
LTCOL Tony Casey
LTCOL Ewart Challis
MAJ Ian Culloden
SQNLDR Paul Hogan
Ms Malathi Carthigaser, DSTO
Mr Paul Prekop, DSTO

Meeting: 29
Date: 1400 to 1620, Tuesday 18 November 1997
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
LTCOL Ewart Challis
Mrs Moira Chin, DSTO
CMDR Tony Ladomirski
MAJ Ian Culloden
LTCOL Simon Gould
LTCOL Tony Casey
Ms Malathi Carthigaser, DSTO
WGCDR John Meier

Meeting: 30
Date: 1415 to 1530, Wednesday 10 December 1997
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
Mrs Moira Chin, DSTO
LTCOL Tony Casey
LTCOL David Harris
LTCOL Simon Gould
MAJ Ian Culloden
Ms Malathi Carthigaser, DSTO
Mr Paul Prekop, DSTO
WGCDR John Meier

Meeting: 31
Date: 1400 to 1540, Tuesday 10 February 1998
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
LTCOL Tony Casey
LTCOL Duncan Burns
SQNLDR Paul Hogan
Mr Paul Prekop, DSTO
Ms Malathi Carthigaser, DSTO
MAJ Ian Culloden
LTCOL Ewart Challis
Mrs Moira Chin, DSTO

Meeting: 32
Date: 1400 to 1530, Thursday 26 February 1998
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
Mrs Moira Chin, DSTO
CMDR Tony Ladomirski
SQNLDR Paul Hogan
LTCOL Ewart Challis
MAJ Ian Culloden
Mr Paul Prekop, DSTO
Ms Malathi Carthigaser, DSTO
LTCOL Duncan Burns

Meeting: 33
Date: 1410 to 1535, Tuesday 17 March 1998
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Dr Jennie Clothier (Chair)
Mrs Moira Chin, DSTO
LTCOL Tony Casey
LTCOL Ewart Challis
MAJ Ian Culloden
Ms Malathi Carthigaser, DSTO
SQNLDR Paul Hogan

Meeting: 34
Date: 1400 to 1530, Tuesday 31 March 1998
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Mrs Moira Chin (Chair)
LTCOL Tony Casey
SQNLDR Paul Hogan
CMDR Tony Ladomirski
Ms Malathi Carthigaser, DSTO
Mr Paul Prekop, DSTO
LTCOL Ewart Challis

Meeting: 35
Date: 1400 to 1615, Tuesday 5 May 1998
Location: Fern Hill Conference Room
Minutes by: Ms Malathi Carthigaser

Attendees:
Mrs Moira Chin (Chair)
LTCOL Tony Casey
LTCOL Duncan Burns
Mr Roger Penhale
MAJ Ian Culloden
Ms Malathi Carthigaser, DSTO
Mr Paul Prekop, DSTO
LTCOL Ewart Challis

Meeting: 36
Date: 1400 to 1600, Tuesday 19 May 1998
Location: Fern Hill Conference Room
Minutes by: Mr Paul Prekop

Attendees:
Mrs Moira Chin (Chair)
LTCOL Tony Casey
LTCOL Ewart Challis
LTCOL David Harris
CMDR Tony Ladomirski
Mr Paul Prekop, DSTO

Meeting: 37
Date: 1400 to 1445, Tuesday 16 June 1998
Location: Fern Hill Conference Room
Minutes by: Mr Paul Prekop

Attendees:
Dr Jennie Clothier (Chair)
Mrs Moira Chin, DSTO
LTCOL Tony Casey
LTCOL Ewart Challis
LTCOL David Harris
CMDR Tony Ladomirski
Mr Roger Penhale
Mr Paul Prekop, DSTO

Meeting: 38
Date: 1400 to 1600, Wednesday 1 July 1998
Location: Fern Hill Conference Room
Minutes by: Mr Paul Prekop

Attendees:
Dr Jennie Clothier (Chair)
LTCOL Duncan Burns
LTCOL Tony Casey
LTCOL Ewart Challis
Mr Paul Prekop, DSTO

Meeting: 39

Date: 1400 to 1530, Wednesday 15 July 1998
Location: Fern Hill Conference Room
Minutes by: Mr Paul Prekop

Attendees:
Dr Jennie Clothier (Chair)
LTCOL Duncan Burns
LTCOL Tony Casey
LTCOL Ewart Challis
Mr Paul Prekop, DSTO

Meeting: 40
Date: 1400 to 1630, Thursday 13 August 1998
Location: Russell Offices Conference Room
Minutes by: Mr Paul Prekop

Attendees:
Dr Jennie Clothier (Chair)
Mrs Moira Chin, DSTO
LTCOL Tony Casey
LTCOL Ewart Challis
CMDR Tony Ladomirski
Mr Roger Penhale
Mr Paul Prekop, DSTO

Appendix C. Edited Interview Transcripts

This appendix contains edited versions of transcripts of the interviews held with the five Working Group participants. The transcripts have been edited to omit any information, which may identify the interviewee or other Working Group participants. Slight modifications have also been made to the transcripts to improve their readability.

The questions are in italic, with interviewee answers in normal text. The transcripts are line numbered, and the line numbers are used to reference the transcripts.

Interview With D1, 12 of April 1999 at Fern Hill Park.

Talking about the information sources used during the study and what sources you remember using?

What sources did we actually use? My main source was always other people. There was very little I actually looked at myself. Most of it was opportunistic, I'd be talking to somebody and they'd suddenly say 'oh I must send you that document' or 'I've got something here'. The only other more structured way I want about acquiring information was certain parts of the study required a questionnaire and then we had to really sit down and think about what we were looking for and what sort of questions we wanted to ask people to elicit information from people. So if we were looking at say going to the projects and we were trying to elicit what type of media they used and then we spend some time thinking about

I guess just thinking about using people as the source. You mentioned that you learning you user were opportunistic and they would suggest something to you. Were there other ways remember learning about who to approach or who might be an interesting source?

Well a lot of it was talked about during the working group meetings. And so in working group meetings everyone can talk about who would be the most appropriate person to go and get information. And I was quite surprised in those working group meetings how people instinctively knew that they were the right person. But that could have been purely due to their position in the organisation, but it is my patch and I'll find that out and I'll find that out while some of them who were around the table immediately knew that they had access to that documentation. So that was quite interesting. There were in terms of the committee process was another way of acquiring information sometimes. In the early days I was completely naïve as to how things operated. And a great source of help was the people in Strategic Policy and Plans and anybody who was doing work for the committees. But if you wanted things like copies of minutes, if you wanted to know how to write a debrief or a brief then you would go to the person and they would give you a copy of the last one and they'd show you what to put together. Some were

even more helpful than that and they said I will put it together for you. They obviously went to other sources and they had copies from previous occasions and said this is the right thing.

Since people were pretty key to the studies of information seeking do you remember how you dealt with the problem. I mean could you just do it yourself. Did that cause a lot of problem?

All sorts of problems arose because of other people. There were people who were extraordinarily reliable I found and they would always do things like review material for you, get things for you. If they said they were going to get it, they would get it and they'd get it in the time frame. There were others who were exceptionally nasty. And the way I actually got things out of them was I actually ... I didn't go straight to their boss, I actually went through somebody who was ... somebody who knew the organisation well and that began with people in strategic policy and planning and I'd ring them up and say oh, look this person isn't willing to do it. And what he'd do is he'd then ring that person's boss. Or he'd ring the person directly and say look I think you're letting the side down. So I often found that rather than being confrontational I'd go through somebody else, I'd go through a mediator because you immediately know that if you rang the person and ask for that sort of information they'd be hostile because they knew they were under performing. So yeah, I'd often go through others in order to get results. But there did come a point with some people where if they hadn't actually delivered the information you'd just ask them to give you a plain yes or no whether they were going to do it or not. And if they didn't then you'd just go to somebody else who would do it for you. For me I either could go to somebody else in my organisation or somebody else in their organisation, or I could actually contract somebody with simular skills who would actually put that information together. There were problems in terms of people feeling unsure that they were going to collect the right information and that even when they had collected the information and analysed it in a form that you'd be happy with and that caused enormous problems just trying to get people to deliver the information to you in a meaning form

That raises an interesting questions of how you found communicate what the study was trying to achieve to these people and ..... certain ways of accessing this

information ..... and you've somehow got to communicate to them what it is you want to know?

You are certainly communicating to them what you want to know. And the best way of doing that was to have a long talk with them. You couldn't just go in there and say this is what I want done. There was normally a long dialogue associated with what it was that I was looking for and how they were going about doing it and what actions they need to take. I thought an even bigger problem with that many people felt that the information they collected was unsatisfactory and did not meet my expectations. Where the information did meet my expectations. But they felt as though better information could be sought obviously, or a better analysis could be done. Because you've got to appreciate that the information that people want to collect complete and consistent information so that if you are doing a capability analysis then your data will stand up to scrutiny and if they couldn't collect complete information and they actually performed a piece of analysis they knew their analysis wouldn't stand up to scrutiny. What they failed to understand is that analysis only goes so far and then judgment comes into it. And you can't do analysis without a complete set of data. You just have to be fair to say your analysis would not stand up in all cases. But you can't actually collect a complete set of data under these circumstances especially in a domain as large as complex as defence.

How would you sort of characterise your responsibilities and your roles?

I'm not too sure really. I guess all my activity was driven by the Terms of Reference The Terms of Reference are really very vague. It just says complete a study in three phases. My main motivation in terms of the working group was to keep it working. To keep people attending. To keep them working with the team, to keep them well informed. To get them to become part of the analysis process, to feel as though they owned the analysis. And I was often quite willing to compromise or throw things out. I didn't really want to present them with a fait accompli in terms of analysis. On the other hand I knew that the main analytical skills remained within DSTO. There was always that fine line we were treading and getting it into our terms.

As the group went through it information gathering, the group gathered a lot of complex information, how did you see yourself fitting in there, you an active information gather

were you more task people to go off and gather information Did you find that a lot of information came back to you and you re-directed it all. Did you sort of task people to just do?

No. I mean a lot of our time was spent in terms of gathering information. Also in terms of gathering comments about work. My job, I thought was I'd initiate the information seeking and monitor it in terms of will we actually get the document we seek and if we didn't get them then I'd seek them through other paths. Or stepping in myself if someone hadn't managed to get hold of a document. I generally found that that didn't work particularly well. Some of the hardest information seeking was when you went to these organisations that don't give out the information and they are designed not to give out the information and you actually have to know quite a lot about the subject matter before they'll actually give you any information. It certainly happened when we approached DIO and DSD. I would say that DIO were the first people we approached and we got them. We made several requests for analysis to be done for some of the meetings and they never responded. But I think by the time we went to DSD we were a little bit more mature and we'd done an awful lot of work on the subject. And when we approached them we were very specific about what we wanted. They knew, or when we told them what we'd covered that really we already knew what the information was and it was far more of a confirmation activity instead of an information seeking one. So what we had done through the various bits of information we'd accumulated. We develop a picture which was a picture that we wanted for the study. By coincidence, lets us to be able to putting a picture together which when another organisation which is normally very sparing with its information it puts out, they then knew that we knew sufficient to work it out ourselves. So we'd almost done like a bit of an intelligence analysis of our own organisation we'd already put that picture together. So we'd worked out what was happening in our own organisation and we no longer needed to seek the information. So that was a bazaar. So those were some of the things we had to deal with. As I say my job initially I felt as though I had to seek it all myself and I did. I tried to Say anything that we needed to get I'd say I'll go and get it. And I didn't, eventually I gave people actions and things that they said they would get something for me. Monitored those and you'd probably see that time and time again that I was constantly asking people to find information or constantly asking people to provide us with information we were happy with, but it got to a point in the study I think that

Moira took on that role and my job was much more in terms of trying to think and trying to bring the study to a close.

What do you mean by bring the study to a close?

Yeah, I found bringing it to a close rather than keeping it going. Because I'd learned how to keep the working group together. Because we'd been to the Defence Efficiency Review half way through the study and there were questions marks then about closing it down. So I'd learnt to keep it together. Closing it down means that you have, you have collected all this information, you've analysed it and you've put it together and you had to persuade people then that that was sufficient to meet the Terms of Reference and that is the best you could do given the level of maturity of the organisation in terms of organisation structures, etc. But you wouldn't find me slipping away to get information, very rarely. You would often notify me through email that things existed and I would tend to pass it on to others, I wouldn't look at it myself.

So you sort of I guess as a focal point for information being send into the study. How accurate were the things that people sent you. How well did they guess the kind of things you were interested in?

Generally very well and they opened you up to sources which you would never have thought of or even thought about how relevant they were. I mean I never ceased to be amazed what people send me and they also say this is interesting because it's this. And I do and I say oh, I see. Now how they knew I'd be interested in that I'm not too sure.

Did you find that a lot of these people you had dealt with them a lot before. Did you that these were people you had interacted with before, or did they just know about you, and the study?

Generally the people who were aware that a study was being done.

So you found that they knew you existed, and that you were the focal point of the study, so that when they found something that they felt would be interesting to the study, they would send it your way?

Yes, very much so. I definitely was not the person who went out and got it for myself.

Did you find that because people were very much your information gathers, that you were seeing the world through there perception. Did you find that or were you quite comfortable with what they came up with?

I was very comfortable with it. I think, when we first started the study I definitely got a fair bit of information myself. If I relied very heavily on people like J____ and M____ and you came to trust them in terms of what they did and there were times you had to review the document for yourself. You'd say that's an interesting document, I want to know more about that. Generally no, it would be OK and you'd receive a praecipe then you'd get some extract from it. I just don't have the time to do it all myself. So you do rely very heavily on them.

I guess as you mentioned you do have a high degree of trust in them, and the people involved, people like M_____, and J___, you have worked with them before, so you have built up an idea of there perspectives, views and abilities?

Yes. We did have a contractor come in but by the time he came in we were far more methodical about how we were doing. But we did allow him to seek his own sources and we kept quite a close reign in terms of the analysis he was doing. But he did provide us, he provided us with copies of the documents which he managed to find. So he, if he provided me, he'd provide me with a lot of documents and I wouldn't read the document, I'd look at where they'd come from, what their main titles were and then just skim through it. This sort of stuff that he's read and he put all this together. In terms of was I happy with the information that people provided me with. Generally yes. If people had drawn conclusions from that information that I didn't agree with or I thought were questionable I would go and talk to them about it. But I wouldn't sit there and pen through things because I don't think that's particularly useful.

The most interesting issue about ... toward the end of the study the information seeking changed. Was that consistent, did you find as you approached the different stages you do and then sort of refine the work?

Oh yes, yes. I found with every phase an area of brainstorming that took place on how they still approached things. It was evident that things became more methodical. We employed Ian, and we just told him to go off and do two scenarios. I__was good at seeking information. I think he used all his military connections and he made completely different sources to the way say in the early stages when we were trying to work out the methods and sources to use. But he provided the same end products. The difference between, I did find a difference though between the activities methodology as Ian went through it and the fact that yes he collected the information and he went through the stages of the method but the eventual analysis did not provide the same sort of insight as when we went through it. So there was definitely something different about the way people were drawing conclusions from the information, so that was a bit different. So yeah, it got to a point where we knew which sort of things that we needed to correct. So we knew that if we wanted to look at the operational aspects of the scenario we knew that we'd have to go to the operational planning and we'd have to get in contact with them. We didn't know that to begin with. Now, we knew in terms of looking at things like communications. We found communications division were exceptionally useful, so we'd go down there and get the information we needed. So yeah, we knew where to get the additional answers and by that point we'd also drawn previous diagrams which we were reusing so we were reusing our own information and we didn't have to seek as we had initially.

How did you use of the working group change over time?

You see initially we didn't use them to seek information at all. It was the first part of the study was much more in building consensus amongst the working group that we had a credible approach to the problem. And we gave them information. Well I didn't seek anything from the working group. All I was seeking from them at that time was that they though a capability analysis should consist of, and we had somebody who thought it should be a shopping list, some people who though it should be something else so we tried to sort of fit some where in the middle. So we started off and I would say that many of our sources were library sources in that we'd be going in and looking for books on the ADF, and we'd be going and looking for things on what is joint and what is command and control and we'd go to the staff colleges and we'd ask them for documents. We'd look in the libraries for examples. And we used to have real difficulty to get information for the phase one reports but, it was only three or four

months. The long haul in terms of the study was in the second phase which was more the various analysis of the situations and that's when I had to ask the working group to provide the information. So I'd have to ask say S___ or what was the latest paper on the command arrangements at HQAST and he'd go out and get them, If I wanted to know about [defence equipment] , I might ask some one from the air force. So if you wanted to know anything I guess having the Navy and Maritime and Air meant you knew who to go to with those issues. There were other people on the working group who never supplied me with information or rarely supplied me with information. The people who were from, I guess they were from strategic policy and plans but they were there in terms of we are people who understand how to analyse things. They would often send comments on our analysis. We didn't ask them for that. They'd look at it they would send us these amazing long document which is very difficult to read. They were the ones that did read it in detail and try to get to the bottom of what they were trying to tell me. So S___ who was remarkably good at writing those documents. There were some people that were very difficult to engage, I don't think we were really successful with them. So Phase 2 was all about getting them to supply us with information. I think phase three was a bit different. So then we went from phase 2 to phase 3. Then we had to do things like the big technical reviews and I left it very much up to the people who were doing technical reviews to work out what sources were needed. Gave them some documents in terms of things that sat around the office, But I didn't really tell them what source to use.

You mentioned the difficulty engaging some people in the work. How did you, just a sort of overall kind of thing did you try to employ any strategies or techniques to somehow focus these groups of people?

At one time we had an industry sub-group because we were getting no where with the industry people, they weren't supplying the information, they weren't actually conducting there work in the ways we need. and so we formed an industry sub-group just to address their area, an why they were not making any progress. Well it backed me up as the Chairman, so I didn't have to tell this person they weren't doing the work they should have. Trying to tell this person that they weren't doing the work. It also got us to look at the problem in a slightly different way because what we felt was well we are not getting the information, we obviously don't talk the same language. So I thought bring me in two other people and see if they can actually persuade these people.

So we had two or three meetings trying to help understand what was required and it didn't make a lot of difference, it was a matter of they didn't actually want to generate the information, they simply wanted to go to sources that currently existed and paraphrase those sources. But those sources did not really meet our requirements. It was a case of people who weren't prepared to put the effort in to supply the information we needed.

I guess another interesting sort of problem was the staff turn over the constant changing of the guard. How did you find introducing these people to whatever had to be done and the way in which information had been gathered in the past, and what major issues had been dealt with?

No. It was something that had to be done on a case by case basis. And there again it depended upon where we were in the study. In the early days people could move in and out and there wasn't much background so there wasn't an awful lot to explain. It became much, much harder as you moved into the later stages. Particularly with people who had a large role in that. So that's the early days we had some turnover, normally they'd give us some warning. They'd also tell us who their replacement was going to be and they'd tell us from what background. Some of them would do a handover, they'd bring their friend along to the meeting and they'd show all the files so they knew exactly what was going on. Some we would meet with. It might be myself or M____ who would meet with them. In the early days of the study I would meet them and as we got more details M____ would often have two or three visits with the people. Some times they would call and say, Hi I am the new replacement, I have read all the files, can I come. Come in and we'll have a chat. By doing that I think it helped them to provide us with the information we were looking for. We could have done nothing and say oh you know you'll pick it up as you go along. But it wasn't really possible. So I think that was a good tactic in terms of introducing people to the topic and getting them to contribute as quickly as possible.

What this something the group as a whole you needed to design what you needed to setting up the language and the background of it is that has been done?

Is this with new members or in general.

Just in general.

We spent a long time creating a language I think. The first piece of significant language we created I think was the command and control, command and intent model that was all created by us. It permeated the whole of the rest of the study so we often had to take people back through that. It provided a keystone. It provided a keystone because it was something where the senior people in the organisation could understand it was sufficiently high level yet it was sufficiently prevalent at all levels of the organisation were able to understand so that was very useful. We went through similar sorts of language creation as far as preparedness was concerned, and we spent a long time building models and explaining those to the work group I remember we spent a lot of time going to talk to people. People who were writing ADF P4 and that was the new preparedness and the organisation doctrine and they had a working group as well so there was a lot of dialogue with their working group and members of their working group. M_____ comes to mind, he was the main force who saw the relationship between the two peace of work. And there was also a Colonel who was responsible for looking at the preparedness aspect. At the same time there was a piece of work going up on [a defence project] And so somebody else was looking at the preparedness form that analytical perspective. So we spent some time working and building a model which allowed us them for people to say either someone is doing something on it or need to speak to so and so. He'll tell you that that is not a good model and you find out from trying to construct something that wasn't right before you could decide what your information sources were. That was very handy. There again we did create a language of our own and we had to create things like the preparedness cycle so that you could relate all the activities that go on in the organisation so you could say where the gaps were and just putting those sorts of diagrams together it helped to other people saying I know the people who did that and I know the people who did that. So putting these high level models together were extremely useful and that went on all the time. Say if you moved later on in the study you'd suddenly say who knows about logistics or [some other defence element], and often people would just supply you with information, but you had to have the structure in place first before they could begin to say right this is the sort of person you should be talking to. So they were very important structures we found.

I guess just when I was looking back though the minutes that did come out a patten of presentation, discussion, action?

And I very early on realised how powerful that was. I'd been to meetings before whereby there's a lot of discussion but it's very difficult to take any action out of it. And that's because you have nothing to focus the discussion on. But I found just by presenting a few slides, it would not only provide some focus for the discussion, it would give me a map to navigate by release the. So if anybody said anything I was mentally tying it back to something back on the diagram and so then I found it much much easier then to look at what actions had to be taken in order to move that diagram forward or to move that subject matter forward. I think without having, Maybe its the way MC works and maybe its the way I work. Its very much in terms of diagrams. But I found those were very useful as a third party, not greatly owned by DSTO but purely to provoke discussion. Quite willing for people to look at them. So it didn't cause too much antagonism. And it I think it also permitted discussion to be open or to take place in convivial environment. It often happened but I found it a very useful technique and I've used it elsewhere. I learnt that in the working group and I used it in the HQAST study as well. I found as the Chair it's my job to get people to start talking about it. Not overly owning the subject. And I can either support my own ideas, ie the ones that I put up, I can support the arguments against it and I can support the arguments for. I found that I couldn't actually chair the meeting and present the presentation and keep control of the meeting.

Well that's about it for my questions, unless you have anything else, or unless you feel there is some else which was important to the work of the study?

I'm just trying to think of some good examples. Of how people really helped us in terms of information seeking. Most of our problem was not enough information and there were issues of the rate the information was returned as well and that had an impact upon how we would think. So we would often change tack pending upon the rate of which information was coming in.

Did you find that you that the information was coming to slow or too fast?

Generally too slow. Generally unless people had any ownership of the problem they'd be very slow to deliver information. A good example was going to maritime headquarters and trying to get plans out of them. Very, very slow. On the other hand, it was really useful when suddenly E____ said I was on the [defence exercise] last year and they went through three exercises like this and here's the answers. So often the source of your information was completely unexpected in that you could go through the official route and try to find it out that way. I'd ringing the person responsible who might be able to tell you who was responsible for this versus here's a guy who knows what's going on in the working group and had to do a related exercise last year. And believe it or not that one piece of information that he provided was critical to 2008 because remember we had other projects coming to us and saying can you give us a scenario that will prove the usefulness of this capability. That was all just because of one person that came up with that piece of information. Well we went to the colleges ourselves. The colleges were … they didn't know what information to give. They didn't see the relevance about the particular exercise to what we were doing. So I found that quite fascinating.

How did you deal with information that was coming in too slowly?

Give up. Well we'd say well I heard the information was not available. So we didn't actually … the end product was a function of what we could get hold of and that was all you'd be questioned about. How much effort do I put in to acquire this piece of information. And it got to a point where time determined … if you hadn't come back in a certain time you'd just say well look just work it out and off we go. And I often find that things would come in nine months later and you'd slot it in. Whatever you'd made up you'd actually put real people and information in. And that was the easiest way of dealing with it. A lot of people did it. Once the information had come in then it was generally easy to find. I always knew that one of the group would have it I never felt as though we really needed a formal way of storing or filing information. Or formal ways of find out who had the document. The team wasn't so large that we special way of storing things. We did acquire a lot of our information through excesses and things. But it wasn't just a matter of how the information was used we had to go and generate the information and I__ went to a special recovery exercise just so that he could actually find out more information. So going and doing is often sometimes … or going and observing was often a good way of finding out the information. Other ways of

acquiring the information was to hold big meetings which were not really part of the working group so we were looking at our scenario which was regional engagement we actually held a big planning meeting in ADHQ and most of the people there ... about 18 people at that meeting. It was a long meeting whereby we went through what would be the issues of planning such an operation. So there again we were using a lot of people who currently do that kind of work because the information did not exist. We had to generate that using all these people. So that was an interesting way. Another way in which we acquired the information and direction was to go and brief senior people. Because they have much, much bigger view of what's going on in an organisation. So you can use people at the working level and they knew so much about it. But as soon as you get to brief people who are one star or two star they often suggested things to you or people to talk to. It wasn't just a matter of them going yeah, yeah, yeah, I appreciate what you've done. They were very helpful with providing us with additional information source. And they'd often call you back for another meeting and call in their people so oh yeah, you need to know about that I'll fix up a meeting for you and I'll call so and so. And that's simply because they didn't have direct access to the information nor did the people who worked for them but they would ... a meeting with them and then you'd find that people had been called in there would be tasked with getting the information for you. They has a clear idea of what's wanted they would either be tasked with get the information for you or there would be tasked with doing the liaison for you. So in that way you would get the information you were after. And they were a very good example of go in and briefing people and talking to them. So those were interesting sources. DSD is always a particularly poor source of information. DSTO is not interested in much ... they weren't interested and they couldn't supply the information.

What do you mean by that. Technology related information, or the understanding of the defence organisation?

No because they only know about a small number of systems or a small number of technologies and certainly was not comprehensive enough for us. People who really held a wide grasp of the subject matter. Even at the PRS level....[tape change]....and to supply me with what they thought were the real issues in terms of the technologies in their area.

What about in understanding the defence processes and defence activities. What that kind of information or knowledge available within DSTO?

Only certain people. Not widespread at all. I found that people in the ADF and in Canberra think it's their job to supply you with information, to supply you with comments. And that's how work gets done. Whereas people in DSTO do not see it as their job to supply you with information and supply you comments. Only a few see that as their role. And I guess that's the difference between having a working group for the ADF people who possibly see themselves as ... well I'm here to be of service. Not the attitude when you go to other organisations. So I found the lack of information within DSTO which is interesting.

I guess one problem, and it seem to be occurring is finding information about the different projects within the different service that seems to be quite an horrendous task?

And it still is. The problem we had there was that no one was responsible for collecting the information. And the problem was very large. So there wasn't a source you could go to and nobody knew the source. The people's information was highly fragmented and when you found out the right person there was no common view of what was an information system. We tried to teach them what we thought were the elements of the information system, but it was not good enough. We could have tried something else to find some coherence across the projects so they could supply us with the information. I think when we had things like questionnaires they were not particularly successful. We knew the information we wanted but it is very difficult to motivate people to fill out a questionnaire. So they tended to get very poor results. Well I also found things were passed on right through the service somebody who it was sixth down the chain and they didn't know why they were producing this information and any model we produced in the first place we completely lost sight of. It was a case of Chinese whispers as it went down. And that's about it really.

Interview With S1, 16 of April 1999 at Russell Offices.

... using as a member of the working group. So when you were tasked with getting information and you went out and got information, what sort of information sources.

Well I came into the Command Control and Support Study quite late because I took over from P____ who originally was sponsored out of MS Branch, I don't know if you recall that, when there was the CAP, the CAP building analysis plan and it was one of the studies. P____ resigned and got out mid 87, something like that. And I think he ... because I was doing in my job in a different branch this command and control policy related and I had developed some sort of interest in the systems at support command and control. He simply said do you want to take this over. And MS had lost responsibility for the CAP anyway. So they still needed, Act PSG as he was then, before it became SPP still had responsibility of the senior study through, that's how I got co-opted into sort of taking over the sheep dog role for the study from a headquarters point of view. So ... what was the question?

The question was about information sources. Where do you remember going to get information?

As I said I was in a technical, not a E____ or a D_____ or ...

So you didn't really see that as your role. Your role was a more ....

It was ... I deliberately steered clear so I wasn't a great contributor to the situation and those sorts of things that required some sort of technical idea of things, but I was more a contributor to the broader....

A lot of the administration and guidance I think would have come you wouldn't it?

Oh it could have yeah, but I was more into giving my ideas and trying to bring the headquarter policies and strategies forward on how we might do things in the real world

and real operations rather than on a ..... And I think I gave more contribution in part 3 of the study rather than in part 2 which was ...

I guess in part 2 you might have stood getting back to speed a bit too?

Oh yeah, I'm not sure I ever did get up to speed the varied and detailed work that was done in that. I mean it was brilliant stuff. A lot of it I'm not sure I ever fully understood except the conclusions though and the detail that came from it ... not the details but the implications that came out of it were good.

I guess like P____ before you, a lot of the things you did were advise, study the working group on how to progress with the committee process on who to talk to and who you need to get sponsorship and stuff like that?

I try to push that line sort of because what I wanted to make sure all of the time, I don't know how successful I was because we actually never got the study really into an open forum where it was ticked off and that was probably ... that's because senior personalities more than anything. But what I wanted to try and make sure was the actually approached the right forums and got the right senior people at least aware of the study and that its outcomes could actually influence something. There's nothing worse than doing a study for years and everyone says oh that's damn fine and it's never referred to again. But at least I think our study, not mine, I mean J____'s study and M____'s study and the team's study had good outcomes in terms of while it itself never sort of saw the light in headlines and highlights and so on, it's influenced the development now of the DIE in terms of its architectural approach and so on. I mean that's brilliant. That's a very good outcome and so anyway getting back to your ... my information sources I suppose are what you're looking for. Nothing more than a general understanding of how the headquarters work, who's up who and who are the players and who are the ones that need to be brought along and particularly in setting up the ... in 97 or 98 I can't remember those early meetings with the principals and getting them involved and those sorts of things. So that was my major contribution and sort of bringing out an enterprise wide perspective to the thing as much as I could.

How do you ... just in general I guess, keep tabs on whose the major player, who do you need to influence, who you can sort of discount because they are sort of on the way out, stuff like that?

Oh, just gossip, keeping your ears to the ground you know, just sniffing out things around the coffee pot. Same way any business does it. And the sad things is it's remarkably haphazard and I can't off the top of my head think of any instances, but there's just enormous amount of coincidence that you'd run into someone in the lift who would just say something 'oh shit is that right, I didn't know that'. And there's so many ... particularly as you get into the senior executives, there's so many different channels and none of them are actually co-ordinated and so something very similar to say something we're doing here will go up in totally different area and you wouldn't even think that they'd even be doing work on that. That's the ... after the DRP or since the DRP everyone's been ... a lot of our leaders have been saying we've got a really good system now because we've got this matrix organisation, this matrix magic b___s___ that they carry on about, and your network and that... It's a recipe for chaos, well it's chaos theory at work because you've got this random thing bouncing around and occasionally they'll connect and you'll got what, isn't that great, rather than having some sort of system where the right people are connecting all the time. And if people ... and it's personality driven if people don't get up and get around and walk around and see people and talk and mix and so on and they sit in their little cubicle and bloody beaver away, they never actually make the connections, the information is never passed and if you like this intellectual capital is never improved or people's holding of knowledge, their store of knowledge is never imparted to the rest of the organisation. So that's one of the real problems with our headquarters now is that its functionally dysfunctional and we don't know who is supposed to be doing it. There's no lines of responsibility any more. People just pick up and run with whatever they like. Like I picked up and sort of decided to do this. Not through any direction but because oh, this looks interesting and its something I'll sort of follow through. That's the haphazard and random nature of it. If I hadn't have no one else in our division would have and it would probably have died through lack of someone in the headquarters taking responsibility for it. That's how random and haphazard our bloody organisation is. It really is extraordinary.

It's scary isn't it?

Yeah, I mean it is frightening. So you never know what information is going up to the top and what information they are making decisions on because you don't know where its coming from or whether it's the right sources and whether everyone has been consulted. What I say shouldn't be interpreted as praise the bureaucratic system but what it makes sure is that informed decisions are made because the information is there. What is happening now is decisions are made that are not necessarily informed because there's no guarantee that all the information is there and those people have actually got a stake in the decision have actually had a chance to contribute.

So I guess there's an element of completeness to it and that the haphazard nature mans that it might work once but it's not repeatable. Because you might ..... bang it's magic and you might not see him for two weeks or ever again?

And he might have lost interest without any ..... And that's the way almost because of that the study was a victim of the random nature of how things are organised here because B____ was the vice up until mid last year and the study was complete, it was taken to a new vice ... D____, when he had just taken over. HSPP was brand new and so what you had was this dreadful situation of the sponsor who was brand new at HSPP who didn't have an emotional attachment or a feeling for it. You had the previous sponsor who actually did have a bit of an attachment to it, A_____, and was a supporter of it. Because he saw this ... because C_____ supported it at AST so there was this army way ... I'd hate to say it, brown shirts pushing the brown shirt line. But I mean that was very good. Then you had my new boss, SPP not having a stake in it, previous guys work, the previous guys sort of thing, the new vice coming in, didn't know anything about it, very tentative in the way he approached it, had the briefing and we were able to get a short briefing session for about an hour on it. Basically I think it went all over his head, and there it sat. Sort of well that was very good, what do we do with it. Oh we don't know and it became too hard for both SPP and BCEF to be able to progress it. And they didn't think ... it was always intended to go to cost and they didn't think that was the place to take it because they didn't actually know what they had. And maybe that was the way ... the difficulty in my other study was actually how the findings were actually presented into the next step because cost couldn't make the decision about some of the findings because cost didn't have the responsibility and the power. That started to be rectified when the DIEB was formed at the end of last year

and that became the appropriate forum for this to go along and the vice wanted to do that. As you know the politics of it, T_____ didn't want to have anything to do with the study. And whether that was on an intellectual base or a prejudice base or a he felt threatened base you can only make conjecture about that. And really if the work since we took the vice out to go and view DSTO and see the work that was going ahead, I don't know if you were out there at Fern Hill, we took him out there to go and view what various bits of C3I stuff that he actually then said oh, I now see the place of this. And we lost five months, but basically it was useful in terms of he tasked me to be his ... to fill his head full of C3I crap for some reason, I don't know why, I know nothing more than the next guy except I know where to find most of the information or put him in touch of the people who can tell him that, that was my job. So I took him out there and then he said the C3I study or the C2SS study yeah, well get that through to the new BIEB and we'll make some decisions about it. And then T_____ then, it seemed to us anyway on the outside, I don't know if this is true or not, this is conjecture on my part, seemed to having also difficulty with grasping the conclusions and recommendations of the study and trying to work out what they meant. I think to the organisation that's ..... basically resisted that and then we have the research and DIE to include the study which led to the architectural work, which led to the big blow up before the last meeting, are you aware of that, of where T_____ didn't want to take it, was unhappy with it, we had to get the vice to go in there and fight to have it put back in and then went to the meeting and they all sort of sat on their hands and said yes, we'll sign up to this. I mean that's the win, finally. But it took blood, bad blood between the vice and dep sec to progress it and to get the architectural approach accepted. I mean big fucking deal, you know. Anyway so that's ... because of changes in personalities at the wrong time when the study was presented the dying of the old DIMB costs not being really the appropriate place because it didn't have enough power to take the study anyway and if they noted it was so what it was as good as dying and no DIEB formed even it was the genesis of that idea started in the vices when he started to understand some of the problems we were having and then realising that the DIEB was the appropriate place to take the stuff because it was making recommendations about how we organised the information environment and so on. So that was really from when the study was presented until almost the end of last year, it was wasted because of the organisational dysfunction of what the DRP left us. That sort of was fixed even though the study again never really was formally presented, its genesis is now this architectural approach. If the study if nothing else said we've got this big thing out there, we've got

to start understanding it. And that's really what if you like a lot of effort has gone into getting to that situation and you might think well intuitively we got there for a dollar rather than a hundred thousand and ten peoples lives for three years, but nevertheless its still a big step for us. And maybe it took the Americas ten years to get to that step in the 70s and early 80s perhaps I don't know. But it took us that long. And now I think we're in reasonably good shape. In terms of information sources I'll use people essentially. Ear to the ground. I use the Internet a lot because I like to find out what America is doing. Unfortunately they've cut that off now. They were fantastic sources, I mean National Defence University, Info War Sites, I mean just an unbelievable amount and all their doctrine and stuff all out there and just saying come and browse you guys and the world did and unfortunately .... What it did was it allowed me anyway having access to their stuff is just to see the trends that ... because we can't get away from what the US does in a small way in that we do repeat what they do, we do so approximately, it's never exactly .. we don't mirror exactly what they do to the extent that we do copy them or mirror them, we do so on a much smaller scale, but if you see a trend happening there, you can say oh there's a fair amount of confidence that we will perhaps go down that path a bit further on. And what I try to do, certainly in a C3I and command and control areas is a little bit ahead of the curve, or try to be a little bit ahead of the curve in those sort of terms. There's an enormous lack of ... I think the working group is lucky getting the people they did on it. Not me necessarily, but the people on it are probably the best there are in the areas around the various divisions and some of the headquarters and defence here in Canberra. There ain't too many other people thinking about the issues and doing them. Or if they are it's in such a small compartment as to be of no real help for such a broad study as the command and control support study. And I mean some of the work ... I can only praise the efforts of guys like D_____ and A_____ and E____ and so on put in over the years because they were there a bit longer than me, or some of them were. And A_ I think was involved in it too for a while. Those guys really, from more of a technical thing, they really contributed an enormous amount. And I hope their ... their efforts will probably always go unrecognised which is a bit of a pity but ...

It tends to happen that way.

They did great work. As of course J____ and her team out there. That was an enormous effort actually. Enormous effort.

So if we could just sort of touch briefly as what you saw your roles and responsibilities. How did you perceive the other people in the group and what they were responsible for did you feel that this guy is responsible for this and this person is responsible for this?

In certain technical areas, yeah. Not technical ... but if it was a service thing I never saw myself as Army even though I wear an army uniform, I saw myself as enterprise wide headquarters view and I've been in the army for bloody 15 years anyway so it doesn't really matter in terms of serving with army I wouldn't know what army does. So for a service thing I really saw the service reps on that thing being very much responsible for making sure that the service advice and guidance was provided to the study. And not their personal advice but as much as possible their organisations view which didn't preclude of course their own personal views being brought into it. But they could speak with some authority for their service. Also from the developers side, from E____'s area some vision of what the thing is. We never probably got enough from the DAO area because they actually do run a lot of the ... their projects are so long, or so evolutionary now to an extent and so long going, for a long time, but perhaps we could use them a bit more. But that's how I saw those sorts of players.

What about from the DSTO side of the house, how did you see people like J____, M____ ..... Did you see them as having any kind of specific roles or specific responsibilities in the study, did they say oh that's something J____'s got to deal with.

As I said I was never there at the start so I sort of came in really half way through phase 2, or whatever it was. But I saw it as their study and they essentially were the drivers of it. I suppose if I had a title I was sort of the co-ordinator between their requirements and the rest of the headquarters or Defence to an extent where it needed it. And it didn't need it because J____'s got access to virtually everyone, she's got a good reputation, well liked, known and respected etc. through all the organisations, can get in virtually any door she wants, so it was never really .... My co-ordination role was really frankly quite small because of her good contacts and willingness to get out and do them. So I saw it as their study. Information could be provided to them but ultimately they'll interpret that information the way they want and that's how I saw it. And whatever they came up with ... except in phase three where I did try to influence a couple of things. I don't know how successful I was, but I had certain view about how we should have

organised ourselves for Defence Information Environment or whatever. And I tried to push that a little bit, perhaps a bit too much. I've always seen the need for tsar. Who did we see in the bloody foyer yesterday, M____ ... Assistant Secretary of Defence C3I from the US. The most powerful, probably civilian in defence in America. Owns $12 million each year himself and influences how $50 billion more is spent. He owns NSA, DIA, NIMA, National Reconnaissance Office, Security people, plus he's got 400 policy people working for him in the Pentagon, this guy is powerful. And he's a C3ISAR, he owns everything.

I guess that was sort of if you had a push on if you need somebody, some focal point ... Is this the man, he's got the money, he's got the responsibility...

And he doesn't do this part-time a couple of hours a month as a chief information officer, you know. That's b___s___, that just can't work now. And the problem we're seeking now is a direct result of this over the years of not having someone with that ... and that's what I've tried to push. Having sort of seen everyone's example from around the world this is what I really think is the way to go. And you can hang him out to dry but don't work. You pay him enough and then you want results, but you've got to give him the power and the authority. Once you give someone that you can then make them accountable. But at the moment we've got no one accountable for anything. It all pops up. We blame the system. My system did it. So that's ... it's like ... if I tried to push a theme anyway that was the theme in ..... And I think J___ accepted it to the extent that she said we should have a chief architect which T_____ didn't like. I don't think he liked the word architect.

Just the sort of final thing to just chat about quickly. As a member of the working group how do you remember deciding that the group needed your input on a particular topic or I can say something here, I've got something to say and they're talking about what a know about. Does the question even make sense to you?

Yeah, it does. I never have any difficulty contributing to any sort of discussion and that's a personality thing. But I know a little bit about a lot of things. And I know a lot about a couple of things. And most of those sort of things I felt comfortable with discussing. So I never had any problems contributing. And where I was clearly ... shit is that right. I said good, thanks for that. But I think I contributed as much as most in

terms of discussions and those sorts of things. But that's … I never have any personal problems with contributing.

I guess that what I sort of also asking is … and I don't know how difficult it is for you given that your role as more sort of guidance and advice sort of area. But just sort of building an understanding of as a group now where at this point it will work and these are the sort of questions that we have and we need to sort of solve. Just sort of thinking about how you felt you got to that point with a few other members of the group because you were working together ……..

It was only mostly during those sessions out at Fern Hill and I'm not quite sure what you're trying to get here. It's not clear to me. I had no problems working with any of them. It just happened.

You just found out at meetings, interactions, discussions …

Yeah. And we'd talk, we'd talk on the phone and stuff like that afterwards and those sort of things because it's the same group of suspects that did a lot of other things. Run a lot of other things, so you'd meet in different fora and different things. I mean there's very few of the guys on those issues and most of them are in that working group. So you'd meet in other areas and of course it's a fairly small sort of circle and that's how interaction… that's how I think trust and acceptance of people's view points and so on …. You know it was developed … but I don't know if it answers your question.

Yes it does actually.

Interview With D2, 28 of April 1999 at Fern Hill Park.

Start by just talking about the information sources that you used, that you were using During the study. So what sources do you remember using most?

If I do it chronologically it might be easier for me to recall. We started off doing a literature search both within the Defence library which included a lot of the Defence reports and things. So we got lots of Defence reports, anything that referred to Command and Control, and then we searched the wider literature to see what was there and included all the American Stuff and after that we looked in different headquarters or we asked around the different headquarters to see what they had expecting that it would all come tumbling on top of us. So after picking ourselves up off the floor and being terrified...we then had to go hunting. So then what did we do? We used the people, people that were known to be active in looking at the area for difference purposes then other then ourselves so we thought that maybe some of their sources could be re-used, so we looked at things like people who had done other studies previously like the Wide Area Surveillance study, the headquarters study and the effectiveness study. And then what we had to do was look at capabilities so we had to reframe the problem to try and find the sources of material which might be available so we could build our own.

So you found at the start it was very much a shot gun approach, anything even remotely relevant you'd just take it and as you progressed with the study you got more selective and more directed in what you were hunting for or did you ...

At this beginning stage because there was little to help us, what we had to do was to say well given that there's no final product, if we were to build or find what are the raw materials. So the biggest first information seeking thing we did was to go to the I think it was the pink or the white, it's a book. And then we had to find a list of all the current contacts and that was ... it seemed like a trivial exercise at the time, but it became one of the most used references, not only by us but by everyone who used the study or wanted information from it ... Could we have a copy of the list. So we had to say what was out there in terms of capability so I suppose what it was really was the instantiation of a definition of capability. And that's where it existed in the pink and white books,

and we wouldn't have though of looking in there. So there was that, that was a big … that took a M_____ long time. And her and J____ literally had to get on their hands and knees and go through filing cabinets because it wasn't particularly well documented electronically at the time. Ok. So then we had all that, and then the next big phase was information on configurations. And we thought we'd go to a manual and find this...this is how we would organise for an operation; nup. So we had to go to ADFHQ and look through their plans and talk to them and see what was available and then finding that a lot of the stuff was still actually being written. We had to get them to formulate it with us. So we had to actually generate a lot of our information from the people in the know. That was the next stage. And then we had to do a mock up of an operation. What we did was we had people coming from the planning area ADHQ and we took out environmentalists from the working group, plus some of them brought along stooges or helpers and we sat around and pretended we were an immediate planning group. And looked at bringing together a operational plan and develop configurations from there. So quite a lot of our information was generated for ourselves and we were concerned at the time about the validity of it we had absolutely no input into it.

Since it wasn't sort of like an index you could go to, how did you know where to turn. How did you know which person or which area or which department would be the best place to start?

The only way to find that out was through the members of the working group or through other contacts that we had at previous operations. I knew a couple from [some previous work] because we knew that they were doing this because we had sat in and watched them, so we said to them we want to get information on this, and they would say 'Oh such and such is doing that' or 'he's reviewing this at the moment or he is re-writing the new plans, so there was that and the things that we didn't know or we didn't know how to get, we had to rely on the environmental representative like the Navy guy who would know and then he would have to know who knew it. If he didn't know he would have to go and find out who knew and then he would give us the name and then we would pay these peoples visits. And then … so it was usually the person to person contact. But often often done via an intermediate.

Did you find yourself seeing the different working group representatives representing different areas?

Unless it had something particular in their background that they said, oh well when I was at the warfare centre I found this out, you should contact this guy because I met him at JSSE.

Sure. I guess when we look back at the study we can see your role change dramatically ... towards the end of the study -- I talk about an observation about the chaining. Did you find that relying on a lot of people to essentially be your information sources and indexes causing problems in terms of problems?

Yes. Well the first major problem was having raw material is sometimes not useful. And if you have to do all the construction yourself you could be there until next century. So what you generally want is to say is this stuff is out there, go and have a look and bring it back to me in this form. And in the beginning and generally in the information gathering process I would say probably less than 50% of the time that happened. More than 50% we would have raw material which we would then have to re format. And that became a huge burden on our time. So the problem was that we would say that this is information that we need and then that would go to the person on the working group. Who I thing probably would have 60-70% understanding of what that was and then they would go back and try and relay that to their minions to say this is what we needed, so you'd probably lose about another 20%. So by the time you got it back they would just guess, you'd get something ... If you were lucky you could go through the process again and find that ... not in the majority of the cases ... because it's such an effort in the military to get someone to do it, to have the time. So it is a one shot. If you miss out you dead. it's a bit of a worry. There was that, and that was the first thing and that went on for some time. The second sort of problem that we had was getting people to think outside the box and so we had to say yeah, yeah we know, you've always thought about information as a bit of paper, but think about it now this way. And so trying to get them to reorient themselves before going to look for information became difficult.

So it was very much trying to share with them the same kind of mental models that you have build up. How did you go actually communicating with them?

Well we ... a funny process. We'd put something up or we'd send it to them before hand and say have a think about this and we are going to discuss it at the next meeting.

We'd do that and then they would all sit around. In the beginning, I mean this changed as a process from being very adversarial in the beginning where J_____ and I came out of our first meeting feel like we'd been fought like tigers. That is how it felt, I felt like shreds had been … to the end where it became more like a fighting environment where you could present something and then have queries. That took a long time to get to that. So what we'd do in the end was to say here's an idea, here's how we think it should be used. What information we want in regard to that. And then there'd be a lot of tooing and froing and then some of them would say oh, I've got to take this back and run it past my cohorts and see what they think and then I'll give you an answer. That was the process. Now the lack of understanding I think came from two things. One it's always difficult for people to change the way they think immediately and then if you're being asked questions at the same time. The second thing was that at the time and I think it's still now there are a lot of studies, revamping and redefinitions done in this area, the Army information and management and the information studies, so everyone was busy trying to define what they meant by these terms. So giving them yet another set of definitions really set them on fire. Which one do I pick? There was a bit of argument about that. So there was always a question of; (a) can I question properly and (b) do I think they're asking the right questions. So that became a bit of an issue. Does that answer your question.

Yep.

If we could just probably move on to your activities and responsibilities … can you think back on your participation in the study, what do you remember being responsible for? What were your responsibilities?

I guess just in very general terms it became my responsibility to keep track of things that is progress of the thing...the study what was happening. Where did we need to go, where had we been, had all those ends been tied up and had all this information come in. What form was it in. And redoing it if I needed to, sending it back, liaising with different people all the time. Checking. Checking that is was valid, things that I got, that I wasn't happy with. Revisiting people. Digging, doing more digging when there was insufficient stuff supplied. And then I had to bring it all together and send it back.

With checking and validating. Questions about checking and validating. How did you do it? What do you mean by that?

Firstly? If it past that test [of being sensible], but not always...it didn't...to say if anything was even slightly contentious I'd try and check it from someone else. So If they said, just as an example, army now uses the new Army 21 task force structure first I'd check do they use it, and is this it? And most of the time that wasn't even it, it was something else. So you had to get the right one so you'd ring up the Army task force guys.

Sort of activities that involve for the other people in the group, did you see them as being responsible for doing particular things?

Yes. Early on we relied almost entirely on them being our eyes and ears into the environments we were looking at. We had a bit of a better window into the joint area, because we'd studied it before and we had more contacts, I guess that was very important. But into the different services it was very difficult and Navy was particularly hard and we were just very fortunate to have a couple, particularly easy to get along with Navy reps, because it's difficult to get any information out of the Navy. I mean we never got anything else to my knowledge other then two people. Very difficult to get ... the Navy doesn't publish a lot of stuff and they don't have people around whereas in the Army, Steve was here, and there were conferences going on and you'd see them all the time and they're very present in the joint area. It was much more difficult to get information from the Navy. And the Air Force was less difficult because J____ and J___ had studies it quite a lot of depth, so they had a lot of contacts. I guess that's what made navy difficult. They were our window into that. So that was there role. The Chairperson's role was the same, crucial to keep things moving. Things could ... especially in the early stages, the chairperson had to keep people from killing each other. So in the beginning the whole atmosphere was adversarial so getting information was very difficult. So that role became crucial. The other role that M_____ played was almost like information tallying. She was very orderly, and she catalogued, she had this set up where all the minutes were kept. So that was vital. I mean trying to do that in retrospect would have been hard. Then we could find things. We'd gathered a lot of stuff. The other people were just ... FDA at the time, this group of people, who are now almost capability development or capability analysis branch used to be known as the

brick wall, once it has hit the brick wall, it stops moving, you just splat out. And having them on the working group was very useful. Because you've got a window into their view and their view of the study so what they used to do was to be on a working group. And they'd sit there and they'd be silent. And then it would come up for review, and they would say no. And so they were supposed to be the review, like the Senate Review Board which was military independent they just became a big dead weight. So their role on the committee. First of all it was our window into what they thought of us, so how we were doing. The second thing that arose was as they became on board they became our conduit so they kept FDA informed of what we were doing and we reduced any kind of threat that they made ..... Now the joint area, people like E____ and his predecessor, and they were very useful in terms of information because they had their fingers on all the studies that were going on at the time, so that was useful to know. People like S____ and his predecessor were very useful in terms of current thinking and how we think of FDA and how we're thinking about our role and how we're thinking about COMAST and how it might be changing. They were just invaluable, and thats all word of mouth or they gave us preliminary copies, draft papers that never saw the light of day. As well as they were our sanity check. Ok. So We'd go through this planning process, and give it to them, and say any good? and they'd say oh yeah, OK, or you have to really include this to make it workable. They were really good for that. Oh yeah, the industry people. Do I have to say anything about them?

That was obviously a major problem that occurred during the study. What do you think caused it? Why was it a problem?

They were clueless. No. They had an agenda which did not come from previous studies. And when we asked them to do something all they wanted to do was give us what they had already done. If we asked them to go and do an information seeking activity they'd say oh well ok, and not do anything. Or they'd actually use something that they were writing at the time as a peace offering. You'd been promising us this role so here have this. No good, sorry. I mean that one paragraph out of a hundred page document had any use.

How do you think that problem was overcome?

Do you really want to know? Well all we had to do was to work around them. We had to include them, and we had to be seen to include them, we had to work around the structure of the we were given. So J____ actually devised bringing in a contractor to help. So she got what she wanted, kept the other people pacified and seemed to be doing the right thing.

The last big area to talk about is just deciding how ... just talking about how the working group itself went about deciding what it needed to know different backgrounds. With a common goal. How do you remember the group deciding that it needed to look at this particular area, or to get information about that?

There were probably two different, vastly different ways they take. Firstly there would be the unsolicited kind of stuff whereby each of these representatives would come across a paper or letter or e-mail or a conference somewhere and they'd say look you need to be aware of it and we need to address it and they'd bring that to the meeting and either put it on as an agenda item or it would just come up in the discussion. And the group would decide at that working group meeting how they would address it. How they would follow it up, who would do it and how we would get the information. The other way was as we progressed with the study we had a fairly rigid framework and we knew that there was certain things we had to cover. And so as we went through each situation or whatever there would be things that we could not derive from what we had and so these things would be allocated to the person who best though they could do it so they were the two different ways.

I'm just talking about the unsolicited information, someone would say hey I've got an interest in this. How closely did it actually match your interests. How right were they in saying hey this is interesting to you?

50%. Sometimes you know you'd get an absolute gem and other times it was more them trying to get you to think along their lines. There was an angle that they'd like to pursue. Or they'd been told that this was important and they'd though you should think it is important as well. I'd say 50:50.

I guess also as we discussed the working group members were very much a key source of information. One pattern that always seems to emerge is the process of presenting

them with something, having some kind of discussion, and then some kind of tasking, was an approach to using the working group?

It became so in the end. In the beginning it was trying to identify a way of working that suited everyone. When you're with a group of strange people you don't know how to proceed. You know there are certain things you need to do, it's a matter of working out the best way to go about it. And it didn't suit a lot of people. I mean there were two types of anomalies because some people had enormous difficulty in taking in the information in the meeting, and they said so generally. Or you could guess that they couldn't. So with those people I'd always follow them up privately by phone or e-mail so I'd know that this person would love it and have a wonderful time with it and he would have heaps to say, and you would have to shoot him to stop. But you know that person that person down the back there sort of looking bleary eyed who had been up doing actual operations for the last 13 hours probably wasn't take a lot in., but he had a lot of offer. So what I would do generally and especially with important stuff, would be to chase that person and say have you had a chance to have a look at it and then go through it bit by bit especially if it was something I wanted from the person. Or if I wanted to make sure they were still on board still understanding what it was we were doing. If I thought someone was getting lost I would do a follow up. That was definitely very deliberate because we got into that habit of presenting and then discussing and then following up and people who got lost really did get lost. It was also important bringing people up to speed too. They'd have to know the background, give them presentations, and give them copies of what we had already done, answer all their questions. So I guess the working group really was that. We got them to work and made them think and contribute.

Just one quick final question ... Making use of people outside of the working group, Did you find that on something that you were tasked with or volunteered to do as a member of the working group necessitated you stepping back and sort of using another group of people to actually answer the question?

All sorts of different things. International people ..... training people ... doctrine people, people from universities. I actually had to have an on-line discussion with a guy from the university about philosophy because there was something I just wasn't happy about and I wanted to make sure it was a logical deduction so we went

through the logic of it. Yeah, CSIRO. A lot of the visitors we had here from other countries, people in Salisbury of course we used them a lot, and they used us. And the people in the field in the, the Defence people so there was a lot of that sort of people. The things to do with the field, the things to do with the defence practise, the things to do with industry and what is out there I mean what DSTO is currently doing in terms of technology and support.

And did you find that the task changed as you moved from the working group to these outside groups?

Yes. That's a lame answer. And actually after that it also became an information giving activity because you actually then go and inform the people. So it was a bit recursive in a sense. To get information you had to give information. So there was a lot of that. We had to do a lot of briefing. And that was a way to get information because they had to know who you were and what your background was before they would even think about talking to you.

And did you find that having go off and having looked in a different domain you that would then be included information distribution network, where the people in the different domain would pass information to you?

Certainly. That happened in a lot of cases. In some cases it didn't and we were surprise we didn't know why we didn't get notified. But generally speaking yeah, that was really useful because they knew something was happening that would warrant their attention.

That all the question I have, unless there is something else you would like to add.

The only other thing that would be relevant is the problem with classification. That did give us problems in terms of storing, and distributing information, and in trying to draw all together and what we could give to some people and not to others. How you had to change the information depending on how it was going to. So that was just an added level of difficulty. Especially in terms of publishing and getting feedback. You couldn't send it over a wire. We didn't have any secret connections. It's better now but it was terrible back then. So that was a bit issue in terms of collecting as well. The big pain

and if you got something and they'd say oh I've got this report and you didn't have your [secure] brief case with you. So you had to try and get out there another time if the person was there and they had the thing and they were willing to give it. So that was a real hindrance, it really was.

How did the service guys cope with his problem. I guess they are more accustomed to working in a classified environment then we are here?

They just carry around one of those all the time as their brief case. They have a secure briefcase something I notices with most of them especially people like E____ and S____ people from those kind of areas, so they would have a CRISP terminal on there desk with is secret. And we has to get additional secure brief cases because we always had them and there were complaints all around. It was an odd thing, something we hadn't expected. And there is storage and all that, it was just an extra complication. And of course being able to work on it.

Interview With S2, 30 of April 1999 at Russell Offices.

...talking about some of the information sources that you used in the study. Gathered a lot of information, what sort of sources do you remember as being the most important and frequently used?

I relied basically on two sources of information, one was I guess largely just my personal experience and I guess the knowledge I've gathered over the time that I've been in ... I was working in the staff environment but also in the union environment. Noting that that introduces some limitations as well. The second part of the information gathering activity I was in formal consultation with selective branch members on particular issues. In an ideal world we should have been able to do that a little bit more thoroughly in terms of having time to staff things around to the appropriate people and have them consider it and get the benefit of a broader set of knowledge and whatever have you. Invariably time wasn't available for that to happen so you then default back to OK, I can give you my opinion. I can sort of qualify and discuss that during the actual meeting if its required and that's the sort of situation we found ourselves in a lot.

When you get in contact with other branches and other people how did you know who to ask?

I guess once again that's where perhaps a bit of judgement comes in. During the time allowed during ..... I inherited it, basically it was a going concern when I arrived and assumed responsibility for it. It was managed previously I guess in the OIS Operations and Information System of the branch and then because it was .. it had implications for the whole of the branch and my appointment was a new one it was felt more appropriate to come in here. The reason being I was expected to take a whole of branch approach. During the course of the study the decision to include more single service presence of C3I as a result of the DER, DRP activities took place and it was expected that advice, more global advice could be developed here in the branch and once again and more appropriately to take a whole of branch approach developing the task. Now how did I know who to ask, well basically to answer that more directly I guess its a matter of making sure ... I thought it was a matter of making sure what

people ... the stakeholders were included. For example if our Remit as a branch wants to supply or provide services, C3I services and so on just in the broad, to the single service environment, overlaid with the joint perspective, then it would be appropriate to staff who work to the single service development branches to see whether that ... but during the time here in the branch their C3I people largely came to work for us. So in essence we largely did most of the thinking on it in terms of ... Certainly there was no time for staff in my view down to for example, the component headquarters who may have a larger staff and more significant presence and so on. So it took place during a difficult time from the higher level organisational and restructuring in DER, DRP broadly under the 100 man service headquarters and the standing up of the draw down from 8 programs to 14 programs and that process. So in amongst all of that I think there's a fair amount of instability. That said I think some of the permanent, the more permanent places, if not faces at the meeting, as you know, were from the service officers. D_____ from Army, I think the Air Force was represented by a passing parade of 2 to 3 people, Navy 2 to 3 at the end during the course of the thing. I guess from FD Joint and the C3I development branch J___ to start with, then myself. So I guess whilst in some ways that's probably viewed as a disadvantage its also a rich pollination of I guess points of view for the team ... I guess for J____ and M____ to soak up. They must have chuckled quite a bit over a coffee or something once the meetings were over.

So you were very conscientious in going out and talking to the people on the functional directory...

No, I wouldn't say I managed to achieve that. What I would say that in an ideal world that's what you would do and for us, unfortunately the lines aren't necessarily as simple and clear as they ordinarily could be. Certainly if for example I was the Defence point of contact, which I wasn't because the other service officers had their own responsibilities towards the working group, if I was, then I would certainly have taken that approach and tried to staff various situations, various scenarios and whatever have you of the committee's ... the working group's deliberations out for comment. But I think that the approach that was taken was probably the most sensible one where we had as much sensible representation as was appropriate and I can't think ....

You then had all the resources to draw on if you needed them?

Yeah. So largely the work was done at the working group meetings. Some people had more time than others. From what I can gather the work group spread the issues ..... So I think it would be wrong for you assume from here that I came back to my office and that there was a substantive staff effort and resources available to do that. As I said at the outset largely the way in which I handled it was when I had the time I had to use my own comments and whatever have you and I think earlier I had more time but as the position became busier and busier it became much more difficult to do that. Fortunately I think the momentum of the working group didn't rely on an enormous amount of input from the C3I development branch rather pieces of information as an inappropriate supply.

That sort of leads quite nicely into just thinking about what you perceived your activities and responsibilities and roles as a working group member were in terms of what did you think you were responsible for?

The fundamental thing that I guess I wanted to be aware of as a participating member was first of all to try and be part of the solution and provide whatever information the effort needed and I think by and large whilst I would have liked to have been able to do more I think that was adequately done. If, as the thing, as I said before, if not ideally, certainly adequately and under pressure as the thing matured. That was the first aim. The second aim was to ensure that I was sufficiently aware of how it was going or what it was doing to understand any particular implications that the work might have, particularly if there was a significant departure from the sorts of things that we were doing that there would be a problem created in the future. So for example, if there was a substantial change in direction or development in the context of the working group that we were uncomfortable with or had a particular issue, it really flagged a problem then I would have been in a position to say did you C3I ... and say listen there's some really interesting stuff coming out of this which in my view is potentially problematic and you need to be aware of it. Because the output of this particular thing as it has gone forward its married quite well into what we see as being the C3I or the Defence Information environment futures, in particularly the architectures approach to life. But had that not been the case well then we would like to have been aware of that so we can take whatever action was necessary. So I guess it was two fold, I was getting something out of it whilst trying hard to provide the appropriate input of things that were happening in branch to the working group.

So you had very much responsibility back to say hey this is what's happening ....

It was a two-way thing and probably more so because of the nature of the thing. It was all about the ..... and the appropriateness and sufficiency of the current arrangements. And it was called ..... to a large extent although it won't ..... for a long time too. So it was very much a two-way relationship. Providing information and where and when appropriate reporting back on the sorts of issues that were being dealt with.

What about other members of the group ..... looking around the table or your interactions with them would you perceive somebody as being responsible for this or would you perceive somebody as doing this particular activity?

I think the representation at the table was generally quite adequate. I think the make up of the working group was from the right organisations. For example you had your Strategic Commander was represented, SVP from the Strategic Guidance point of view, close to where guidance from VCDF and so on is, and when its at that level. Obviously HSVP at the time was the actual sponsor of the task. The environmental head offices, C3I development branch, certainly an adequate presence from the DSTO side of the shop, not only in terms of the responsibility for progressing the actual task itself, but very capable people aware of what's going on in the program at an appropriately similar level with J____ and M____ etc. So in as much as there is sufficient talent around the table and also from those interested agencies with responsibilities in the various areas I think that was more than appropriate. I think one of the problems that we did have though was that it was a particularly busy period of time and the organisation continues to have that change churn, or organisational churn, it's still going around and we haven't reached a steady state where people are comfortable or in control of perhaps an environment that managed what matters and what doesn't and in a position to give informed comment. And increasingly I think the quality of the advice was more about the calibre of the individual rather than reflecting the considered position of the organisational program. So a lot of decisions had to be made because otherwise if they weren't made they wouldn't have been made. They had to be taken based on what you had at the time. So a lot of information sources for me was based on me. Where I'd been and what I'd done, my experiences. And that's not necessarily a total view. And

in a sense I guess you therefore, and in my case as I said to confine my knowledge and my advice and the information I provided to that which I was comfortable and what I knew a bit about and where I didn't .... So you caveat things that way.

Just one more thing to chat about and then I'll be out of your hair. Just as an group sitting around the table, talking about deciding what information you needed to answer the questions you had and what the questions were. So looking back, how do you think the group itself went about saying the right thing, we need to know this or we need to think about that, or this is an area that's important to us?

I think what the group ... the way the group worked probably changed subtly along the way as milestones and whatever became due. I think ... I had a lot of admiration for the way J____ and M____ worked with the group because largely there were a prickly bunch of opinionated service personnel who they were trying to drag a set of data out of. Somewhere ... you could almost call them recalcitrant because they were nominated to the group and they came along, they didn't really know what they were supposed to provide so if an issue arose they'd waffle on about that for a little while and so on. And there were times at those meetings it got hijacked on an interesting discussion but something that was slightly skewed or off the main path and I sense that that happened from time to time. I think the way in which ... I think a lot of the interesting issues arose out of a workshopping kind of approach. What the next milestone was, we've got to produce an interim report ... we focused very much on trying to target the particular client for the product that was going to be produced, the interim brief ... a presentation by J____ or M____ at a senior level tried to shape and influence the nature of the products to try and, I guess to coin a phrase that's been used more recently, to mask complexity, although this is a frighteningly complex environment with concepts and constructs ..... I guess unless you hang on to them tight as they are being explained have the potential to get a bit too scientific in terms of relating to the environment and move away from those things which our leadership generally, the tangible, the practical, the here and now and what difference is this going to make to me ..... in command or in the near future thereafter. Those sorts of discussions happen where various people went oh gee whiz you can't do that, I wouldn't do that, what I'd do is this and then we'd pursue than and the rationale behind it and so on to try and shape the way and nurture and develop the way in which the product is being produced so it was I guess we enhanced it's chances of success. Now that was done. If

your question was how did we identify it and how we worked together, I guess it was more and more in the sense of a workshopping kind of mode. As I seem to recall there was a bit of feedback at this time about a set of papers or the presentation and it moved a step forward so a little bit of an update on that and you'd get an update back on who we'd spoken to and whatever have you and that would set the base line. And then there'd be some more discussion, some more points of view. Some people would have different comments on the paper and have time to do so. Others maybe didn't and they took the lead off whoever did have a bit of ..... in terms of knowledge and in terms of investment of time on the paper and in terms of time with the purpose of the meeting. So I guess a range of different techniques on working it in. The thing I guess I enjoyed about it is that although it's still a relatively relaxed sort of environment where peers got together to discuss an issue. The fact that there were regular meetings and generally those that came did want to have it. And the leadership of the working group was ... I think everyone clearly understood, M____ and J____ and so on and the support team there were working very hard and they really wanted to try and be part of the solution which would help but a very relaxed way of doing it. So it kind of worked well. I quite enjoyed the experience.

How did it compare to ... I guess you experienced getting involved in similar sort of work. Did it seem to work a bit better?

I frankly haven't been involved in the same type of meeting as that which was seeking to challenge itself with what I believe was quite a difficult task. One which the organisation remains in my view uncomfortable and that is this whole thing of command and control and the various layers of it, the matrix of it, the technologies in it, the processes, the people and whatever. In terms of an organisation or arrangement in a functional area I don't think in Defence you could find a more complex environment. Virtually everybody who works in this environment. The further you get away from our environment in C3I the simpler your world becomes. Certainly the issues may well be difficult but they are more definable, the factors that impact it are clearer, the range of complications and whilst may be serious and have high consequences are more readily identified, etc. etc. so I guess a difficult environment for the issue at hand and the reason I say I haven't previously been in a difficult environment like that is normally for most of us, and in particular the military have come through an environment where you have more autonomy and control. You can set and define the environment around you and

this environment nobody controls it. There's no one in charge of it. OK you could say CDF or the Prime Minister or whoever you want, but in actual fact all of their powers to influence, shape, control, develop or whatever, this environment are limited and limited very significantly. So to engage in this kind of work where you're crossing all sorts of boundaries where the data hard data on what is and what isn't is hard to find and define. For example we cannot measure the environment and you saw how difficult it was during the meetings to try and … scenario X, Y or Z say OK what will we use. What exists. And make some judgement about how adequate or otherwise it was. And the model that the girls came up with, M____ and J____, on the transforming, the processes that occurred in command and control environment, that was certainly innovative believe me. There were some familiar things ..... I came into it after they had been put in place, so I had a bit of catching up to do, if I ever did catch up to it. But the ..... was quite interesting working with them, but not … I'm not familiar working ..... Normally it's about you're here on a job, you keep ..... here are your resources, get on and do it, much more structured. That environment was far more fluid and far more challenging in other ways. Seeking to explore I guess models that you weren't particular familiar with. Try and conceptualise a different way of the organisation to look at it from a whole range of different dimensions. So from that point of view it was very professional.

One thing I've spoken to a few other members of the working group and been through some of this ..... What they keep coming up with is working group members such as yourself and being group proactive and sometimes saying this is interesting to you, I've got a document that's come on my desk and I think it has impact. Did you find yourself doing that quite a bit?

I did. I can't recall the specifics. Certainly that which I was aware of in my environment here and I guess there's always that saying that you use what information you've got within 20 feet of you and whatever that saying is. Certainly I became aware of a number of things which I thought potentially were useful for them to look at. And at least, for example if the knowledge of the command and control support study, if you want to … for members such as myself who came into it late were probably down at this level, the longer serving members, and I remember there was one Air Force fellow who had done it almost from the get go, he was in there in the early days, and very much longer stalwarts, so he would have been there somewhere then you take another

few steps to some of the others in the group and then perhaps the ones pulling it all together, the M____'s the J_____'s and so on, up here in terms of knowledge. You could make some sort of assessment, say OK if you haven't seen this I think this may help so I'd throw it in there so that someone perhaps more informed than I about where it would fit in the context could have a quick look at it and say OK this is potentially useful or make a judgement and say OK I've read that, that does not threaten anything about our model whatsoever, oh gee that's a useful little piece and yes, with a little bit of adjusting we can factor it in. So that was where I was coming from and I think there may well have been a handful of things I think I sent M____.

So this is just basically based on your understanding of what the study is, what is available and what it's goals are and what the current issues are and then ...

So that's the ..... and I'd run a bit of a filter over it and if it was potentially ... In the back of your mind most of the working groups were happening fairly frequently, I think fortnightly or whatever, you sort of had that awareness. In terms of the value add I still maintain the team did an extraordinary job given the fact that most of the resources were pretty well part-time and once back in my own bunker it was very much pumping the bilges at this end and time available to review drafts and whatever have you was limited. So most of the good work was done I suspect in the working group and also in

That's all the main points I had unless there is something ...

I guess the one comment that I'm sort of left with, oh there's a couple actually and a theme I guess has come out from the time you've been talking to me and that is it was a very, very difficult task and I think one that was done exceptionally well under the circumstances. Busy people, part-timers etc. etc. And I'm delighted to see it's come to fruition and it has lived on into the Defence Information environment ..... taken by the committee and now born fruit in the form of the architectures approach to life and whatever have you which is going to be the next ... I guess our short term future. I'll have probably a reasonably significant role in that regard because I think HCD has been given the ..... to progress the architectures work and naturally enough that's come down to DDC CID ... seen fit to give me the co-ordinating role for that. So I suspect that will end up being now developed into a ... I suggested we need to get the stakeholders together, the interested players together to now look at working up plan for

279 the way ahead. So it's good to see good work with contributions from a range of good
280 people pulled together by the team living on into something that is useful. That said it
281 would have been good to offer more, but maybe what we did offer was adequate
282 because we got to an end state which I think was useful and more may not have
283 necessarily have influenced a better outcome etc. One of the things that we have to bear
284 in mind at all times I guess is stepping back from the process and looking at it from the
285 outside is that we do live in a very political environment. I think the team from the
286 outset would have acknowledged that once P____ moved on as HSVP it was very much
287 a concerned patch there that sponsorship at the senior level had lost its way and I think
288 that very much concerned ..... one stage and we had to go into a damage
289 control mode and that concerned us a little bit because there was a point in time there
290 where I wondered very much about whether or not all this good work would come to
291 nought. It's like giving someone the two or three volumes of stuff and saying well
292 thanks for that. I think that is another area, just going back a bit to one of your earlier
293 questions where I think some of the advice from some of the more experienced
294 members on the board, in terms of where to now. What's the political landscape, how is
295 that developing, how is it going to shape the decision, who is going to take that
296 decision, how are we going to manage it after its done because if we don't work on that
297 we may as well just close all our books now and go and have a cup of coffee and just
298 have a chat about what the weather is like because it wouldn't have shaped anything.
299 We may have had a lovely time talking to each other but if it doesn't produce an
300 outcome or change something or make a difference, one questions the time spent. So I
301 think that was an area where we had to ... there was useful input from those around the
302 table just keeping feedback coming in about where the environment was moving, how
303 the senior ..... what we needed to do next. Some judgements about awareness,
304 shaping ... as I said earlier on the types of products and it was a matter for the substance
305 of the input in terms of the outcome recommended architectures approaches whatever.
306 So those are the sorts of observations that I would make and I just delighted to see that it
307 came into something useful. And I guess look forward perhaps to working with some
308 of the people, I don't know who ..... working up the plan to moving forward
309 from where we are now and that'll have to happen in the relatively short term who from
310 the organisation ..... residual understanding will actually take a contributing
311 role from here. I suspect J____ in her new job may well have a statement to make and
312 its one of the things that I discussed with ..... a little while ago is that earlier
313 today, is how are we going to generate a sufficient centre of gravity now around this

follow-on architectures work to make sure that its robustly put in place and the short-term objectives that we think is going to be useful and produce some results and he was very positive about all that. On balance at the end of the day's play I think it was a very successful campaign. And I call it a campaign because it certainly went through multiple phases and through various objectives and I think got managed through some troubled times to a successful conclusion, or a successful objective which has now set the foundation for going forward and I think certainly I perhaps may not have had the opportunity to say so, but a hearty well done to D___, M____ and J____ and the hands-on team who were the full time project team.

Interview With S3, 4 of May 1999 at Fern Hill Park.

If we can just start by talking about some of the information sources you used as you worked on the study. The study gathered a lot of information. What type of sources do you remember using the most?

I suppose the primary source is just one's own knowledge of the Department, remembered processes, remembered issues. Because the genesis of the discussions points about where we should be exploring came from the collective wisdom of the work group. So I premise the comment about where I got the information by saying the shaping of what information was being sought was being done by the working group so it was the collective wisdom of a bunch of disparrent people as to was this likely to be an issue, did we need more information about it and if so did anyone know where we might find it. A lot of that came out of the depth of the postings that people had had over the years. They'd say under my case I remember my time up at the welfare centre and remembered the roles and responsibilities of the welfare centre as it was back four or five years ago and therefore would sort of say oh I think we need to find out more information about that and I may not necessarily find it. One of the other working group members might say oh I'll pursue that. In terms of anything that I have decided that I would follow up from our end I then sort of took back to the office and it was either a question if I knew it was written down somewhere I could obtain a copy of the document by ringing up someone I knew had it or if I didn't I could ring up headquarters at man command or training command and say hey guys you should have this, I want some information about this.

If you didn't know who had it it was the people who should have it according to ...

Yes it was going down and saying in an organisational sense this is the place that should have it. But also, you might notice in the hierarchy of things I should go to Primary Headquarters down to Land Command who might go down to a Brigade who might go down to a CCO for example. But I might know the guy at CCO and just say I'll ring him up and either get what I want straight away or if it requires some work at least I can say this is what I want, this is what I think I want and they say probably what you want

is this. So ..... a request dealing with the coal face and then I would put the request down through the chain by either a telephone call or an email or a minute.

Did you find that if you had say an information request you'd give it out to somebody who would ask somebody a question and then it would then be passed on to somebody else?

Cascading effect. That's the theory. Now by the same token what I said I might use my own knowledge to drill down deep into the organisation in the first instance. Similarly if I passed the problem down via the commands they might use the same thing or they might cascade it down through the chain of command. The trouble with the chain of command of course is that its quite ponderous because you've got so many steps to go along. Something like the command support system is indicative of the fact that the work that the group is working on and the timetable they set themselves doesn't necessarily correspond with what other people in the organisation feel is important. So I could have taken a task, and I did on several occasions look I'll come back to the working group next time with that information. But getting that information was outside my control in so much as I could do the right thing, I could quickly, within a day or two put the request in to somebody else, but if it's not on their priority list eventually you know you have to coerce them or you didn't get it then you'd get it later.

That raises an interesting question about how ... what you were tasked to do as a working group. Did that change when you went back to the office ..... go off and think about this and then analyse this and then you went back to your office and you'd find out what you were doing was actually something different to ringing people up and saying...

I suppose that's the nature of group work is that you can sit in a meeting and we can decide the action items for this are the following. There's the normal human misinterpretation or whatever between what someone asks you and what you think you were asked for. On some occasions I want back and within a day or half a day or something M____ or someone would ring up and say look I know we said we wanted that but I think on reflection we probably need something else or I might have a task and gone back and said gee I think we've actually solved that a different way and rung M____ back or J____ and said hey I know I said I think this is important but perhaps

what we really want is this. Or even it would be having talked to someone else and they have shed some more light on it and come back and say well actually what you really need is this and perhaps its not our part of the ship to organise that you need to go and talk to ... . one of the other guys to get that. There was a bit of that. I mean its not a precise ... its not a science, it's more of an art form, finding information particularly since as an organisation Defence is particularly poor at finding information that isn't strictly catalogued and we're very good at setting out our document theories, there's a nice hierarchy of doctrine and you can pretty well look up the index and there'd be a pamphlet on air defence for example and its reasonably intuitive where you'd find that. But some of the information, particularly that we wanted here which was what are the issues and concerns, you know that it's probably embedded in long forgotten or long archived post-exercise reports and in many cases it was probably as effective, if not more effective by going in for either anecdotal information or talking to someone who deals with the problem on a day to day basis and saying well is there a theme coming out of your post exercise reports that you can think of. Oh yes. [defence equipment] in the field is a disaster for example. That might be sufficient in granularity to go back into the study. Or it may not have been, they might have wanted some more detail.

So I guess a lot of discovery of who do I ask and where do I look is very much a persons knowledge and experience, time you spent in the organisation...

Yes and the use of the various tools around. I mean we ... a common problem that I face is that there is no Defence intranet, no cohesive repository of information. You can't just turn to one search engine and go searching through all instances of ... something that we might be interested in on the work group. It would be a combination of going through the library, the doctrine library, look up a Notes database or something else. So the knowledge that something might exist or does exist was important as a first step of discovery as it was as to having the information anywhere. And I mean the study reflects that. I wouldn't be advocating that we got it all right because it was also a time dimension so we had to find something, answer a question and then move on to the next thing and if we couldn't find anything well enough, we'd have to make an assumption and then run with that. But that's the nature of the issue that we're dealing with.

How do you see it going. You mentioned the knowing where to look kind of element and the kind of information ... How do you think that influences what you going ..... Do you find yourself that you frame your information requests in terms of resources that you know about?

I'd say that strongly influences it. And I suppose it's the ... it's the personal paradigm of what you're expecting to find. Are you expecting to see something written down, will it be in a library, will it be in a series of government publications etc. Yeah, it very much colours what you look for. But the organisation is a fairly conservative organisation. It does have ... whilst I can argue that we don't have a proper intranet, we do have an internal network of things but they are quite fragmented paper based way of doing business is the traditional one and we're very good at having files, reference libraries etc. It's just that the access isn't immediate or quick enough for the sort of things we were dealing with and in many cases you just didn't know all the information out there, or even suspected. You can only suspect that there might be some information, you might go looking for it. But I think converse to that, given that it is not a precise science, it's not a deterministic pattern, during the time I was on the working group, and I certainly wasn't there all the way through, a range of different people came and went as postings changed. And you generally got a reasonably strong coverage of the major issues just by the nature and the diversity and the numbers of people here. The problem is of course to try and capture as many of the issues as possible you really need a wide group of people to be listening to the problem and they might offer their two bobs worth. In a small group like this, the maximum there was just as many people who could sit around this table so we're talking about a dozen people. We weren't going to find them all and I'm sure you could put a different series of a dozen people against the same problem under a different leadership and a vision of where they wanted to take the study and they'd say this isn't what happened with the study, I'm just saying it would be different. You'd probably come up with certainly some differences, but probably also quite a lot of commonality. Certainly the key issues were the ones that were quite obvious and the same issues that would come up regardless of which group of people worked on it.

So the key issues were driven by or articulated a lot by the working group members do you think...

I was fairly new to this high level strategic environment if you like, but from what I've gathered in the last three years the key shapers of the outcome you will get from something like this are terms of reference and the members of the group. The positive exclusion or inclusion of certain parties representing a group of interests will influence it. Now if you put an overwhelming communications bent in as opposed to an overwhelming warrior bent, you'll get a different result. A skew, but probably not that far from the central issues.

If we can just move on and talk a little about what you perceived your activities and responsibilities as a working group member. Just thinking about what kind of activities do you remember performing as a working group member?

Essentially the leaders of the study, J____ and M____ were doing the major conceptual work and they were presented a meeting work so far, the sort of issues that they had thought were important or they wanted some thoughts on, and the working group, I felt we went into ... a different set of eyes over the issues. Bringing in our wealth of experience to tease out some things. I mean I was deliberately controversial at times. I'd actually throw a pebble in the water if you like and argue about something and turn around and argue back again the other way because I felt that we couldn't just agree on something at face value. We really needed to poke it and tease it and sort of pull it around a little bit. So it was the first level of ... not so much peer review but of wider exposure of their work to get it into shape where essentially the two points could be presented to a steering group because it was obviously a mechanism process here where there was a sponsor for the task and there was a steering group set up and then the working group. And the working group obviously did all the heavy stuff but had to periodically go back to the steering group to get further guidance. So a lot of the working groups time was spent thinking about whether the issues that M____ and J____ were working on were relevant, were as well expressed as they could be, particularly considering the steering group and audience. In some cases it might be as simple as trying to get it into military speak or defence speak. Other times its trying to make sure that the leaders weren't heading down what might be self evident to them, but a path which we weren't bringing along other people with you because it has to be a growing of awareness of what the study was up to and what the outcomes were. And I must admit that several times during the course of the study J____ and M_____ were flat out keeping the working group up to speed with what they were trying to do. I'm not sure

how the steering group went I wouldn't want to be criticising their decisions, but the reality of it is they only got exposed to the study as it went along on a few occasions. All the busy people would have been ..... trying to grapple with the issue give some sage comments and then move on. And I suppose I have a sense that at the end of the day the enduring things that came out of the study were to some extent blinding the obvious. Hindsight being a lovely precise art. There was a lot of, not ..... work, but a lot of work that was done which could be described as spinning the wheels or scene setting for sensitising other people to what the issues were and what the outcomes might have been.

And other Working Group member?

Yes, coming back to the role of the working group, I saw a very important role as a member of the working group to also convey to people that I dealt with on a day to day basis what the working group was up to in an outcome sense. I became obvious early on in the piece that we were heading towards an architectural approach to that DIE was what we really needed to have. So I spent a fair bit of time making sure that I came across other activities I could say for my own mind where would that fit into, is there a relevance to what the main support study would do and if there was try and identify that there was quickly and then be able to influence or sow some seeds in these other projects because one of the other things about decision making at the strategic level is that you've got to start getting things in alignment. So you can get synchronisation of activity and since the work group has finished and the architectures approach has not been endorsed by the DIE, in fact you can see the hiatus between the study finishing and it getting noted in the DIE brief, I have been actively been pursuing the goals of the working group which was to come up with a sensible way of going ahead and trying to progress that in another form.

So not only has the working group been not only settled ..... or making contributions that way but you also went back to your office and you were almost an ambassador or representative to the study to your greater environment and saying this is what we're thinking about, this is how it works?

Not just a representative but actually using engagement with other activities and other parties to test the veracity of what we were doing in the working group and then also to,

if appropriate influence other people. So if they were grappling an issue which the working groups work had some benefit for it might be as simple as say you guys we really need to talk to M____ or go and see what's going on down there, or this is probably the way we should be doing these things or the way we should be heading. So it's an influencing in a wider form that just the working group. Now that just might be me. I don't know if the others were doing the same thing.

Did you find you ... people started identifying you partly with the study. Or ..... he's working on the study, I'll send him this bit of information which might be useful to the work he's doing with the study?

Another one of our problems and ..... problems in the organisation is who do you share information with. Now part of doing one's job is trying to understand what information is relevant and who owns that information and how do you keep track of it. I mean there's absolutely no way that any of us can get all the information so in the same way that we'd got to ..... where we target our services we, I believe, would have to help people that we deal with in targeting their distribution of information to send you the right stuff. So as part of my ongoing duties and relevant to the working group here I would cultivate people's feed of information to me if I thought that that was relevant. So making sure that my own chain of command representatives were aware of my involvement in the working group. Aware of what I thought the big issues were and what my information requirements were for facts, rumours, ideas or whatever. Because the formal system was too slow and with this sort of thing you often needed to be using your typical network. Network of colleagues and people who you think have an interest.

How would that match ..... do you find that often matches your interests or is it just stuff that you chuck out?

Triaging the information you get sent is an interesting thing. You know you get 60 emails in a day when you're away from work. I tend to try and cultivate, I'm still doing it, cultivating information sources. I'm trying to let people know what I'm interested in and what directions I want to be going so they can do a bit of self filtering before they send it to me, but realising that most of the filtering has to be at my end, but it's easier to chuck something out in the filter than not having it imported in the first instance.

And that raises the point of if you're on a working group or activity I think it's also important to identify what are the other similar or related activities so that you either get yourself on those as well or at least get a connection with those. So this was quite mainstream in terms of the wider scope of my activities in Army Headquarters. But it was then identifying as other things popped up well what's relevant to going ... poke my nose into it if you like. It might be inviting myself into a meeting or by similar activities or just saying hey to the desk officer, can you give me a drop copy of what's going on.

When you sat around the table and you looked at ..... did you see them in a particular role or see them taking responsibilities ..... he deals with that or that's Colonel X's problem.

I certainly see the other members in a group wearing a variety of hats. They obviously wear the hat of the organisation they're coming from so whether you like the individual or not there's a hat of whether you like them or not or whether you can relate to them. There's the hat of what do they contribute to the intellectual debate around the working group and there's the hat they wear in an organisational sense where you may not like them, and may not thing they're very good but actually there the person that you need to have the conduit through to the organisation. And its quite evident who the heavy duty performers were and who the light weights were as the group went. But also as the study ran over a variety of areas, as would be expected some people had more to say than others on different areas. So in one or two meetings you might think well that one person hasn't contributed much but it's because they haven't had much to contribute or the organisation doesn't have much of an involvement there. Then I suppose the trick was then to make sure that you woke them up enough to say hey this problem now really is in your area.

I guess we talked about this a little bit before and I just sort of how the group itself goes about what it needs to know and deciding what additional information it needs and did you find a lot of that was very much resolved in the discussions?

That was a preponderance I suppose. The cause is the fact that they were the full time people operating on it and we were the part-timers. So following from that they were the ones that did most work between meetings. All of us were in response mode and on

more than one occasion I was more than happy to have not have done anything between meetings. Not so much happy, I couldn't do something between meetings and I'd come back to a meeting and say I'm sorry we haven't got the answer on that and if it really is that important I'll try and get it up on the list of snapping alligators. Now it would have been a different situation if there had been a full-time working group and focus for a short time on something. And I go back to my original point, the key shapers of this thing are things like terms of reference and membership. And obviously the membership then goes into was it full time or part-time or a mix and in this case it was a mix. I mean there was often a diversion of views and so it wasn't like it was a consensus thing. Clearly J____ was leading the activity and she had to have a result at the end and we were sensible enough around the table to say well here's my two bobs worth and well ..... but that's what we think it is. I think it was a responsibility that was understood that if there was a real stuff up where it seemed as though we were heading a track where we knew we were going to have a real problem with, part of the working group's role was to make sure that we disclosed that as early as we could so that if ... It didn't come to that but had there been a case, for example that I would know that it was totally unpalpable to follow the recommendation that we were going down, I would say that this is what you're going to say, be aware that I will be counter-briefing the executive to say that this is wrong. Now that never happened, but that was another role that the ..... Some of the members of the working group were going to be directly involved in the briefings to the senior principals and others weren't. Now in my case I was principle adviser to the [highlevel service repesentative] on all matters that go to the DIEV and previous to that to the DIMV. So knowing that this was likely to end up in that sort of forum. I think they've written two sides, one is how it was going from the ground up and the other one is how does it fit in terms of what Army officers ..... I mean these things are all about the outcome as a basis of moving forward on other winning resources, setting a schedule whatever, therefore it was all the issues that the stakeholders were bringing to the table to make sure that they're particular things were progressed. Obviously J____ and M____'s role was to make sure that all our issues, that she was taking an appropriate independent view considering them and making her way forward. But I'll be the first to admit there was strong vested interest in the outcome of this think and therefore making sure it was fact. So on finding information that supported the ... I never consciously created false information or didn't get information to skew the study the way I thought that Army wanted, but I certainly made sure that if there was some information that supported the case that we

were going to, that was brought in and it was put in, in what I would consider appropriate priority.

So you used to what ..... make sure that the Army view was at least tabled and taken into account?

..... but realising that it was not an adversarial thing, it was the growing of a solution and saying ... unless I advocated for it for my program and the others for their respective ones, who was going to. And it was better to do it early to get the issues teased out so you've got a stronger solution than sit back ..... at the end of it and say I didn't really have a chance to say what I wanted to say so I'm now going to have a go and put the knockers on the output.

...being part of the actual process to put make it all happen?

I'm not sure how this actually relates to what your study is, but it's interesting to see how the output of the working group has been ... or of the study has been taken. The ... When it was presented, as I understand to the principles, it wasn't greeted with unanimous agreement and therefore the study hasn't actually been accepted in the by a sign off by the DIEB for example. The sponsor, as I understand, accepted it because it was now complete, but the outcomes of the study, ie. we should have an architectural approach to this thing was then progressed by taking it in to a different context and putting out. So it went up to the DIEB as a different item rather than the DIEB considering the outcome of the command support study. One of the recommendations was taken out and presented as a separate paper. And that's just interesting in terms of decision making.

Why do you think that was, was the study as a completed product too much?

I think there were some issues in the recommendations that were unpalpable to some of the senior decision makers and so there was a conscious decision not to endorse the ... this is just my view, a conscious decision not to endorse the report but to sort of note that it had happened, and one of the key aspects was this body of work which they'll agree to. So it's making sure there's limited credibility or undue credibility attributed to it. That's how I read it.

In what way?

The DIEV originally was going to be asked to note the report and agree the recommendations. Eventually it got presented with note that the following the command support study it's obvious that an architectural approach was the way ahead so agree to the architectural approach, but that was as far as the reference to the command support study.

Is there something that you see ..... where they liked some bits and they didn't like other bits and take that out?

Oh I think so. Take the defence efficiency review for example. From my part of the ship a whole bunch of recommendations came out of that and its interesting to see how they are implemented in different ways. Not unexpectedly. Some were embraced wholeheartedly and some are being damn it we've got to do this have we. Well how can we be seen to be doing some of this and actually shape it a bit differently. And I suppose you start getting into all the 'yes Minister' type tactics that come into here about a decision might be no decision. So it was interesting to see what happened to the report and the way it was finished off, and put on the shelf. Things may have been different if it was done a different way. But the key outcome was achieved so that's fine. But the challenge of course then was to look at what other strings from this generic area and how it is shaped. So it would be interesting to see that in the next six months or so.

Do you think more bits or more chunks of this study are going to see the light of day in different ways?

I think so, of course then your faced with the issue of what do you do with the collective expertise that people build up in something like this work. I mean all the uniformed people sitting around there get posted from time to time. Do they get posted into a position where they can take that work forward or not. Should they be. Does this raise the issue of should we start having a bunch of people who would be defence information environment specialists so that future working groups like this could be formed with people who have benefited previous experience and some currency of the

knowledge of the issues. We were picked for this job based on our appointments. Now a working group could equally have been formed by a bunch of people based on their individual expertise. But that was not the case this time.

How do you see the actual ... the ..... did you think there was a good mix or did you think it was to one sided?

I think they pretty early on identified who the key stakeholders were. Then it comes down a little bit to the personality of the individual. The ... I mean without pointing names at someone, I do remember one of the working group members rightfully was there because of their ... the organisation they represented, but essentially delivered nothing and kept on having excuses and eventually didn't come. Now what was the Chairperson's response to that? One response could be to get hold of the group and say hey you guys aren't pulling your weight, but then bringing back a recalcitrant and angry person to the working group may not have been helpful. So it was a fairly informal working group I would say. That is not the ... X number of people must turn up every time and if you can't be there put someone else in instead. A lot of that reflected the nature of the work. It was not something where another person could pick it up easily. It was quite an overhead in learning it. So in my case, I couldn't make a couple of meetings there was no point in me sending my offsider because he was just ... wow what's this about, this is up in the treaty group stuff. So I think the ... it was interesting to see the dynamics. We didn't have anyone who upset us in terms of was totally disruptive. I think we had a few who were under performers as I said the one that I mentioned before was pretty well a waste of time. But Jenny got what she needed by other means so it wasn't like there was total obstruction. It was probably a fairly typical working group that I've been involved in.

So this sort of style ..... is quite common.

This is sort of a virtual teaming approach because you can't get full time people together to do the work you've got to try and bring in people occasionally. I would also add that I think to put a full time group together for any length of time they quickly loose touch with reality. One of the benefits I brought to the working group was my other activities. As I said before by seeing the wider picture of Army's activities in the information environment, when you're talking about this particular area of work you

can see the relevance on the currency of other issues. But as I say it comes down to very much how you set the thing up which parts of the organisation are well represented, how often you meet. I mean we were meeting at one stage there fortnightly and it went through a monthly … that sets a tone. We met for a couple of hours late in the afternoon rather than a couple of hours in the morning. That again sets the tone. I'm a great believer in meetings of having them up against a hard deadline, like lunch or knockoff time so that really stops people drifting on. You say we need to talk for a couple of hours or so and you start at 9 in the morning well there's not compelling reason to finish at 11. But if you say we'll start at 3, or 2 as we did here, then by 5 o'clock people are running out of steam.

That really covers everything I want.

All right, well I'm happy to clarify anything later on if you feel you want to.