Modelling information behaviour: linking information seeking and communication

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Declaration

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Abstract

Over many years much academic research has been carried out in the field of library and information science (LIS) into the information-seeking behaviour of individuals, and many models and theories of such behaviour have been put forward. Similarly, over an even longer period, there has been much research in the field of communication studies, particularly mass communications, and a large number of models of communication behaviour have been described. The research described in this thesis sets out to build on this work, learning from both fields, in order to develop a more comprehensive representation of information behaviour.

Existing models were analysed to identify important elements of information behaviour and from these the new Information Seeking and Communication Model (ISCM) was formulated. This is the first time that a model of information behaviour has been constructed in this way from a range of different models from both LIS and communication studies. The ISCM is more comprehensive in scope than previous models. Those developed in library and information science are usually concerned with the information user and information seeking, while those from communication studies typically focus on the communicator and the effectiveness of the communication process. The ISCM takes into account both information users and information providers, their separate contexts, the activities of information seeking, information use and communication, and factors that affect them.

The ISCM has been designed as a generic framework capable of application in different environments. Its validity has been tested in health care, where it has been shown to apply to the information behaviour of physicians as information users and to that of pharmaceutical companies and the National Institute for Health and Care Excellence (NICE) as information providers. Its practical value has been demonstrated in evidence-based medicine (EBM), where it offers insights into the reasons why clinical practice does not necessarily follow EBM guidelines. It has also been found to be of use in identifying areas in which users (physicians) and providers (pharmaceutical companies and NICE) can improve their information behaviour in order to achieve their goals.

This thesis contributes to knowledge by building on previous research and models to develop a more comprehensive model which provides practical insights into information behaviour and which has the potential for wide application.

Chapter 1

Introduction

Much research has been done into human behaviour in finding, using and communicating information. Many theories and models of such information behaviour have been developed and their number continues to grow (Fisher *et al.*, 2005; Case, 2012). In view of this, it is reasonable to ask:

- How far do these theoretical frameworks build on each other and on previous research?
- What is their practical value?

The research reported in this thesis builds on existing models to develop a new representation of information behaviour that is more comprehensive in scope than previously described models. The validity of the new model has been tested by studying information behaviour in health care. The findings are presented and their significance is discussed. By investigating the validity and relevance of the new model, the research also provides evidence about the wider value of the concepts underlying the earlier models.

This chapter presents the background to the research, outlines its aims, provides an introduction to the methods used and gives an overview of its contribution to current knowledge. The chapter finishes with a description of the structure of the thesis.

1.1   Background and rationale for the research

The term "information behaviour" has been defined in different ways. One widely quoted definition is that of Wilson, who describes it as "the totality of human behaviour in relation to sources and channels of information, including both active and passive information use" (Wilson, 2000). Pettigrew *et al.* (2001) refer to information behaviour as "the study of how people need, seek, give, and use information in different contexts, including the workplace and everyday living." Ingwersen and Järvelin define it as the "generation, acquisition, management, use and communication of information, and information seeking" (Ingwersen and Järvelin, 2005, page 259). The term has thus been taken to encompass a number of

different activities and, in particular, information seeking and acquisition, use of information, and communication.

Much research has been carried out into information behaviour over many years. Studies of information seeking and use date back at least as far as the Royal Society Scientific Information Conference of 1948, at which several papers on the information behaviour of scientists were presented (Wilson, T.D., 1999). The information behaviour of health professionals has been studied since at least the early 1940s (Sherrington, 1965). Research into communication has an even longer history: Lasswell's studies of propaganda and mass communication, for example, date back to the 1920s (Laswell, 1927).

Many theories and models of information behaviour have been developed as a result of this research (Fisher *et al.*, 2005; Case, 2012; McQuail and Windahl, 1993; Baran and Davis, 2003). Most, however, are restricted in their scope. Those developed in library and information science (LIS) typically focus on the information seeker and information-seeking behaviour. Mass communication models, on the other hand, mostly focus on the communicator and the effectiveness of the communication process, particularly from the perspective of the communicator. Since so many theories and models have been formulated it is legitimate to ask what their value is and how far they build on each other to develop understanding of information behaviour in a practically relevant way.

Theoretical frameworks from library and information science are often based on work done solely or mostly by one researcher in a particular environment (Foster *et al.*, 2008), and it has been suggested (McKechnie *et al.* 2001) that they have had little impact outside the LIS field. Over the years there have been criticisms that LIS research often fails to build on existing theory: "Throughout the period [since the Royal Society conference in 1948] the one constant complaint of commentators has been that researchers have not built upon prior research in such a way as to cumulate a body of theory and empirical findings that may serve as a starting point for further research" (Wilson, T.D., 1999).

Case (2002, pages 284-287) reviewed the criticisms of research into information behaviour and asked "Has any other literature generated so many complaints of low quality, or exhibited so many signs of being overstudied?" Referring to the practical value of the research and theories developed he commented: "what of the *utility* of

information behavior studies?... to read some of today's information seeking research it would seem that we have now reached the point where the scholarliness of the studies correlates with their degree of *uselessness* for institutional purposes.... Certain themes and sources are cited by one study that are picked up in later studies, but without necessarily leading either to an advancement of theory or to an accumulation of comparable findings."

In similar vein, Dervin (2003) remarked on the narrowness of focus of much research: "In every field, researchers study information seeking and use in yet another context (culture, organization, community, domain, and so on) without regard to any understandings of information seeking and use in other contexts."

This research set out to address these criticisms by building on existing models from library and information science and from communication studies to develop a new representation of information behaviour – one that encompasses seeking, use and communication of information.

The new model has been used to examine information behaviour in health care in order to investigate its validity and the insights that it can provide. By testing the model's validity, the research also investigates the practical relevance of the models on which it is based and the elements of information behaviour that they identify.

Health care was chosen to test the model because it has been a fertile field for exploration of information behaviour. There have been many studies of the information behaviour of health professionals, especially that of physicians (e.g. Coumou and Meijman, 2006; Davies, 2007; Dawes and Sampson, 2003; Gorman, 1999; Lacey Bryant, 2000) and the model can build on the extensive existing research. Physicians have to deal with a large volume of information every day. They need details of the patients they are treating, the conditions being treated and appropriate medicines, and they may need a range of other information (Gorman, 1995; Smith, 1996). To meet these needs they may actively seek information from a number of sources, including colleagues, journals, books, websites and other computer-based sources (Bennett *et al*, 2005; Davies, 2007; Smith, 1996). In the UK a large amount of information is also proactively communicated to physicians by a variety of individuals and organizations including colleagues, professional bodies such as the Royal College of Physicians and the Royal College of General Practitioners, the National Health Service (NHS) and associated bodies such as the

National Institute for Health and Care Excellence (NICE), and also by the pharmaceutical industry.

Much of this information seeking, use and communication takes place in the context of evidence-based clinical practice, which has played a significant role in influencing information behaviour in health care in recent years (Evidence-Based Medicine Working Group, 1992). In the context of the use of medicines the term that is more often used is evidence-based medicine (EBM), which has been defined as "the integration of best research evidence with clinical expertise and patient values" (Sackett *et al.*, 2000). In order to understand what this means in practice it is important to clarify what constitutes "best research evidence". NICE aims to foster EBM by providing national guidance on health care. It is "the independent organization responsible for providing national guidance on the promotion of good health and the prevention and treatment of ill health ... Ensuring care provided is based on the best evidence available" (Chidgey *et al.*, 2007). Thus to a significant extent it acts as an arbiter of what is the "best" evidence for the UK National Health Service. In determining what is the most appropriate treatment for a particular condition, NICE considers not only clinical effectiveness but also cost. From NICE's perspective, "The development and use of clinical guidance based on assessment of clinical and cost effectiveness is probably the most important approach to ensuring patients derive the full benefits from clinical research" (Chidgey *et al.*, 2007). Based on his or her clinical experience and expertise, however, a physician may have a different view about the best treatment for an individual patient and the relevance of cost considerations. One of the criticisms of evidence-based medicine has been that it may threaten the autonomy of the doctor-patient relationship (Cohen *et al.* 2004). The pharmaceutical industry may have yet another perspective. It is a major producer of the evidence about medicines, evidence that is in turn used by NICE and by health care professionals. A company may believe that the evidence that it has produced supports the use of a medicine that it wants to market, whereas NICE may take the view that it is not appropriate for use within the NHS or that it is too costly, leading to headlines such as "Breakthrough prostate cancer drug rejected by NICE" (http://www.bupa.co.uk/individuals/health-information/health-news-index/2012/06022012-prostate-cancer-drug-rejected)

Many of the studies of physicians' information behaviour have examined their information needs, information-seeking activities and the sources they use, but few have investigated the value of existing theories or models in elucidating this

behaviour. This research tests the validity of the new model by using it to investigate the information behaviour of physicians and the communication activities of NICE and the UK pharmaceutical industry. These two information providers were chosen because of their role in providing physicians with evidence about medicines and because both seek to influence physicians' actions and decisions. NICE disseminates clinical guidelines and other information in order to influence clinical decision-making (http://www.nice.org.uk/aboutnice/whatwedo/). Pharmaceutical companies provide information to physicians about the medicines that they market and also to promote "the prescription, supply, sale or administration" of those medicines (ABPI Code of Practice for the Pharmaceutical Industry, 2012, Clause 1.2, http://www.pmcpa.org.uk/thecode/). The research also uses the model to seek insights into the practice of EBM.

1.2 Aim, objectives and research questions

The aim of this research is to develop a new model of information behaviour that
a) builds on existing theory and research findings,
b) is more comprehensive than previous models by explicitly taking into account both the information seeker and the communicator or information provider, and
c) has wide applicability.

The specific objectives are:

1. To review existing models of information seeking and communication in order to understand the factors affecting information behaviour that they identify

2. To develop a new, more comprehensive model that takes into account what is known about information behaviour from these models

3. To test the new model by investigating how it applies to:
   – the information behaviour of physicians
   – communication to physicians by two major information providers: the pharmaceutical industry and the National Institute for Health and Care Excellence

4. From this empirical research to validate the model and identify any modifications that may be needed to improve its practical application

5. To use the model to gain insights into information behaviour in the context of EBM and identify ways in which this may be improved

To address these aims and objectives this study seeks answers to the following research questions:

1. Can the features of information behaviour identified in existing models be used to construct a more comprehensive model that encompasses seeking, use and communication of information?

2. Is such a model valid and applicable to the behaviour of both information users and information providers?

3. Can such a model provide insights into information behaviour that are of practical value?

1.3 Research design and methods

An extensive literature search was carried out to identify models of information behaviour including those that focus on information seeking and those that focus on communication (Chapter 2). The features of a selection of the models found from the literature search were analysed in order to identify the main factors that they portray as affecting information behaviour. The models were chosen because each contributes different perspectives or additional detail to those found in the others. The features identified from the different models were then used to develop a new model that depicts information seeking, information use and communication and the factors affecting these activities (Chapter 3).

To test the validity of the new model a novel approach was used. First, to investigate its relevance to information users, the literature on the information-seeking behaviour of physicians was reviewed (Chapter 4). The information seeking and other behaviour of physicians has been widely studied (Case, 2012, pages 301-308; Davies, 2007) and the current research builds on this extensive body of work. The literature was analysed using concepts from the model that are relevant to information users, with a more detailed qualitative content analysis of five representative published studies of physicians' information behaviour. The technique known as deductive or directed content analysis (Hsieh and Shannon, 2005; Elo and Kyngäs, 2007) was employed, using coding terms derived from the new model.

Second, to test the model's applicability to information providers, semi-structured interviews were carried out with staff working for NICE and with employees of a

selection of pharmaceutical companies in the UK (Chapter 5). The latter included senior staff from companies' medical departments, which have particular responsibility for providing non-promotional information, and senior staff from their marketing departments in order to obtain differing perspectives. Participants were invited from small, medium and large companies, again to obtain varying perspectives. With permission from each participant the interviews were recorded and were then transcribed. The transcripts were analysed by deductive content analysis using coding terms derived from the new model.

As a result of these analyses it was found that, subject to minor modifications, the model provides a valid representation of information behaviour in health care.

The model was then used to gain insights into information behaviour in the context of EBM and to identify ways in which this may be improved (Chapter 6).

1.4   Contribution

This thesis contributes to knowledge of human information behaviour by developing a new model with wider scope than previous models, including information seeking, information use and the communication of information. In the field of library and information science, scholars have typically restricted their consideration of information behaviour to information seeking: "In studies on information behavior in LIS, a user-centered perspective is adopted. These studies place more emphasis on information users (or seekers/receivers) and users' information needs. In contrast, less attention has been paid to information providers; typically, information providers are simplified as 'information sources' or 'information systems'" (Bao and Bouthillier, 2007). Although some scholars in the LIS field have also referred to information sharing or communication (Bao and Bouthillier, 2007; Pilerot, 2012; Talja, 2002; Wilson T.D., 1999, 2010), the model put forward in this thesis is the first to take into account the features of information behaviour described in a range of models from both library and information science and communication studies. By developing the new model on the foundations of existing theoretical frameworks, the thesis answers a criticism levelled against research in library and information science that it often fails to build on previous research (Vakkari, 2008). In addition, the empirical research carried out in testing the new model provides evidence of both its validity and its practical value in explaining information behaviour in health care. This not only answers Case's question about the utility of information behaviour studies

(Case, 2002, page 287) but it also endorses the relevance of the earlier models from which the new model was developed and the elements of information behaviour that they describe. Through its wider scope, the new model offers further insights into information behaviour and the thesis provides examples of these in the field of health care.

1.5   Structure of the thesis

The six further chapters in the thesis cover the following:

Chapter 2 starts by clarifying the term "information behaviour", reviewing how different authors have interpreted it and related terms. The chapter then considers theory in information behaviour before focusing on models. The literature on models from both the LIS and communications disciplines is reviewed and descriptions are given of a range of models. The chapter finishes with a summary of the factors involved in information behaviour identified from these models.

Chapter 3 describes a new Information Seeking and Communication Model that has been developed to include the key elements of information behaviour identified from the other models. The model is shown in graphical form and the chapter describes its features in detail and how it relates to the other models.

Chapter 4 first reviews the literature on the information behaviour of physicians and analyses it to determine the characteristics of this behaviour. These findings are used to test how well the new model represents physicians' information behaviour. Then the method of deductive (directed) content analysis is described. The use of this method to analyse a selection of published studies of physicians' information behaviour in more detail is described and the findings are used to test further the validity of the new model.

Chapter 5 describes the interviews carried out with staff from pharmaceutical companies and from NICE. The findings from content analysis of the interview transcripts are reported. The chapter finishes with a discussion of how far the model reflects and is validated by the findings.

Chapter 6 reviews evidence-based medicine and how it is put into practice. The new model is used to identify factors affecting information behaviour in the context of

EBM and to suggest ways in which physicians, pharmaceutical companies and NICE may improve their information activities to meet their EBM goals.

Chapter 7 provides a summary of the research findings and what they add to existing knowledge. Limitations of the research are discussed and suggestions are put forward for future research directions.

The thesis covers published literature on a number of different topics, including models of information behaviour, the information behaviour of physicians and evidence-based medicine. Rather than having a single review covering all this literature in one chapter, separate literature reviews are provided in the chapters dealing with these topics. The literature on models of information behaviour is reviewed in Chapter 2 (section 2.4), that on the information behaviour of physicians is reviewed in Chapter 4 (section 4.2), and Chapter 6 (sections 6.2 and 6.3) reviews literature on evidence-based medicine.

Chapter 2

Conceptual representation of information behaviour

2.1 Introduction

In 2002 Case wrote: "Although it has not yet [been] widely used, the concept of 'information behavior' is a useful one that I hope will catch on.... It is a term whose time has come" (Case, 2002, page 76). At the time when these comments were written there were already a number of articles, research reports and theory papers referring to information behaviour, but since then many hundreds more have appeared as well as a growing number of textbooks (e.g. Fisher *et al.*, 2005; Ford, 2012; Spink, 2010; Spink and Heinström, 2011; Wilson and Maceviciuti, 2012).

This chapter reviews the literature on theoretical frameworks that have been developed for information behaviour. It is first necessary to consider the terminology used in order to clarify what is meant by information behaviour and what the term covers. Theory in information behaviour is then discussed before examining in detail a range of conceptual models developed by different authors. The chapter finishes with a summary of the elements of information behaviour identified by these models.

2.2 Terminology

Despite the burgeoning interest in human information behaviour there is some inconsistency from author to author in the way in which the term is used. Wilson (2000) defined information behaviour as "the totality of human behavior in relation to sources and channels of information, including both active and passive information seeking, and information use". Spink and Cole (2006b) noted that "The field of library and information science has historically included the research area of human information behavior that seeks to study human behaviors related to information seeking, foraging, retrieving, organizing, and use".

Sonnenwald (1999) included communication in her definition of information behaviour: "information exploration, seeking, filtering, use, and communication". Pettigrew *et al.* (2001) also recognized that information behaviour can include

communication of or giving information, defining it as "the study of how people need, seek, give, and use information in different contexts, including the workplace and everyday living." Other authors refer to communication in the form of information sharing as an aspect of information behaviour: "information-sharing behavior refers to the entire process of information transfer which includes information-seeking and information-providing behavior" (Bao & Bouthillier, 2007). Wilson included information sharing ("information exchange") in his 1981 model of information behaviour (shown in Figure 5 on page 28 below): "...the user may seek information from other people, rather than from systems, and this is expressed in the diagram as involving 'information exchange'. The use of the word 'exchange' is intended to draw attention to the element of reciprocity ..." (Wilson, 1981). The concept of information sharing thus implies a reciprocal relationship between information users, one of whom may communicate or make information available to the other and vice versa. Communication may also be carried out proactively without Wilson's "element of reciprocity" by a communicator that hopes to inform and influence the recipient. This is typically the case in mass communications by the news media, advertisers and other organizations (Baran and Davis, 2003).

This inclusion of communication widens the concept of information behaviour beyond that of a user seeking and using information and brings in the role of the communicator. It is this wider concept that is used in this thesis, taking the definition of Ingwersen and Järvelin (2005, page 259) as a concise definition: "generation, acquisition, management, use and communication of information, and information seeking". Subsuming "management" under "use" of information, the focus in the thesis is on information seeking and acquisition, use of information and communication.

The "use" of information also needs to be defined. Choo *et al.* describe it as follows: "Information *use* occurs when the individual selects and processes information which leads to a change in the individual's capacity to make sense or to take action ... Thus, information use typically involves the selection and processing of information in order to answer a question, solve a problem, make a decision, negotiate a position, or make sense of a situation" (Choo *et al.*, 2006, page 495).

All of these definitions of course include the word "information", which is itself a term that has been defined in many different ways. Detailed analysis of the meaning of the various different concepts of information is not the purpose of this thesis. Other

authors have produced such analyses, including Case (2002, 2012), who uses the following definition: "information is whatever appears significant to a human being, whether originating from an external environment or a (psychologically) internal world" (Case, 2002, page 40). It is this broad definition of information that underlies the concept of information used in this thesis. As the definition makes clear, information may come from an external source or internally from the mind, knowledge and memory of the information user. Both the external and internal origins of information are relevant to the development of the new model described in this thesis, as explained in Chapter 3 below.

2.3   Theory in information behaviour

Developing theory in the area of information behaviour is problematic, not least because the term "theory" has different meanings. Pettigrew and McKechnie (2001) cite at least ten definitions, ranging from "a set of explanatory concepts" to "a description or explanation of the nature of things, not in the more restricted sense, used in some sciences, of denoting fundamental laws formally stated and falsifiable". The last of these, the scientific concept of theory, is difficult to apply to human behaviour. As Case (2002, page 136) states, few, if any, social science researchers believe that they discover "universal and absolute laws regarding people".

In the field of library and information science, many theories of information behaviour have been proposed (Case, 2012; Fisher *et al.*, 2005). One reason for the number and variety of theories is that they are often based on work done solely or mostly by one researcher (Foster *et al.*, 2008), each model reflecting the environment in which the research was done. Also, different metatheoretical perspectives have been used to develop them. They have included, for example, cognitive, constructivist, constructionist, ethnographic, and other approaches (Bates, 2002, 2005; Goodall, 2004). The situation is somewhat similar in the field of communication studies. Baran and Davis (2003, page 35) raise the question: "why is there so little agreement about what constitutes a generally accepted theory of mass communication?" In answer they point out that there is no single overall theory: "mass communication theory is really mass communication *theories*, each more or less relevant to a given medium, audience, time, condition, and theorist."

Dervin (2003) referred to "the increasing chaos of human studies and user studies: the plethora of theories, concepts, approaches, methods, and findings ... In every field, researchers study information seeking and use in yet another context (culture, organization, community, domain, and so on) without regard to any understandings of information seeking and use in other contexts." In the wider field of what she terms "human studies", in which she includes library and information science and communication studies, Dervin comments that "we are drowning in concepts, variables, methods, theories".

As there are so many different theories, developed for different environments, it is pertinent to ask what their practical value is in providing insights of general applicability to information behaviour. Pettigrew and McKechnie (2001) have investigated the use of theory in information science research. They examined the 1,160 articles published in six LIS journals between 1993 and 1998. Of these, 396 were found to refer to "theory" in the title, abstract or text. However, the meaning of the term "theory" as used here was vague. Pettigrew and McKechnie considered that an article referred to a theory if "the author(s) described it as such in the article (applicable to established or proposed theories) or used such key terms as 'conceptual'… 'framework', ' grounded', or 'underpinnings' to describe an idea/view or approach as such." Just over a third of the articles (n = 396, 34%) referred to theory in this sense in the title, abstract or text. About 580 theories were cited (page 66), which originated from library and information science, the social sciences, the humanities and the sciences. It is clear, however, that some of them were referred to in very general terms, since they included broad concepts such as "Graph theory", "Newtonian physics theory", "Probability theory", "Postmodernism" etc. (pages 71-2). One hundred and eighty of the cited theories were attributed to LIS authors, and 84 of the articles proposed new LIS theories. Bearing in mind that these findings were from just six journals covering the years 1993 to 1998, the fact that such a large number of theories or frameworks were developed again prompts the question of their general practical value.

Of the 1,160 articles that Pettigrew and McKechnie reviewed, 688 reported empirical research. On average each of these research papers cited 0.75 theories (page 63, Table 10), which means that at least a quarter (the actual figure is not reported) did not cite any theory. It thus appears that a significant proportion of the research was not explicitly based on existing theory. Previous analyses by Järvelin and Vakkari (1990, 1993) and Julien and Duggan (2000) had shown that only a minority (6 to 18

per cent) of LIS research studies sampled from various years between 1965 and 1994 were based on theoretical frameworks.

McKechnie *et al.* (2008) reviewed 117 articles reporting empirical research on information behaviour that were presented at Information Seeking in Context conferences. Theories or theoretical frameworks were explicitly referred to in 80 (68%) of the articles but the other 37 (32%) did not mention any theoretical underpinning of the research. Furthermore, the practical impact of the research was limited. Forty-eight of the 117 articles (41%) did not report practical implications of their findings. Of the 69 articles (59%) that did include practical implications, 39 used "vague, general or otherwise unclear statements rather than explicit delineation of implications for practice."

Over many years there has been what Case (2002, page 284) calls a "history of complaint" about the quality of research in LIS, with weaknesses in theory and a failure to build on past findings. Reviewing papers accepted for the 1996 and 2008 Information Seeking in Context conferences, Vakkari (2008) commented, "Compared to studies in 1996 the studies in 2008 seem to construct weaker ties to the earlier relevant research in the sense of building a conceptual framework or explicating properly how the results contribute to the existing body of knowledge."

This is not to deny that progress has been made in the development of theory in information behaviour (Vakkari, 1998). Nevertheless, progress has been slow in developing theory that is "fertile" (Järvelin and Wilson, 2003) in that it develops understanding of behaviour and has practical application. Järvelin and Wilson (2003) therefore suggest that "waiting for the substantial theories to prove to their fertility may take some time". In the meantime, they suggest, it may be fruitful to consider the merits of conceptual models.

2.4   Models of information behaviour: literature review

"Conceptual models are broader and more fundamental than scientific theories in that they set the preconditions of theory formation ... they provide the conceptual and methodological tools for formulating hypotheses and theories" (Järvelin and Wilson, 2003). According to Bates (2005), "Models are most useful at the description and prediction stages of understanding a phenomenon. Only when we develop an explanation for a phenomenon can we properly say that we have a theory.

Consequently, most of 'theory' in LIS is really still at the modeling stage … Models are of great value in the development of theory. They are a kind of proto-theory, a tentative proposed set of relationships, which can then be tested for validity". In view of the lack of an overarching theory of information behaviour, the focus of this research is on models.

The number of models of information behaviour described in the literature runs into the hundreds, some being narrow in their scope and application and others being more general. In the reference work *Theories of Information Behavior*, Fisher *et al.* (2005) describe over 70 models or theories from the field of library and information science, while McQuail and Windahl (1989, 1993) refer to over 60 models from the field of mass communication. Many others have been developed. The following sections review a representative selection of models, including those that focus on information seeking, those that focus on communication and diffusion of information and some that make reference to both of these aspects of information behaviour. They are taken from both the literature of library and information science and that of communication studies. Each model is considered in some detail to identify the main factors involved in information behaviour. A detailed analysis permits comparison of the different models to show the features that they have in common and the features that differ in order to produce a wide perspective of information behaviour from which to construct a new model.

2.4.1   Models from library and information science: information seeking

The field of library and information science has produced many models of information behaviour (Fisher *et al.*, 2005; Case, 2012) over many years, some models dating back as early as the 1960s (for example: Feather, 1967; Rubenstein *et al*, 1966; Voigt, 1961). Most LIS models focus on information seeking rather than other aspects of behaviour: "The information seeking approach, based on a problem solving perspective of human behaviour, has been the dominant approach within the field of library and information science" (Spink and Cole, 2006a, page 3). This approach has concentrated on factors such as the information seeker's needs, personal factors such as demographics, the context of the information-seeking activity, the process of information searching, the sources used, the relevance of the information found, and the outcomes. However, most models consider some but not all of these factors.

A number of models of information-seeking behaviour will be reviewed here before considering the wider concept of information behaviour, which – as discussed in section 2.2 – includes communication. The models have been selected for consideration because each contributes different perspectives to those found in the other models or additional detail and, with one exception:

- they provide insights into general features of information behaviour not specific to just one type of information user – either because they were developed as general models or because they have been tested outside the context in which they were originally developed;

- they have been tested by other researchers apart from the originators;

- their significance has been demonstrated – they have been widely cited in the literature on information behaviour.

The exception is the model of Gorman (1999), which is included partly because it is relevant to the information behaviour of physicians and therefore to the research presented in this thesis, but also because it includes concepts that are of wider relevance, such as the distinctions between recognized and unrecognized needs and between pursued needs and those that are not actively pursued.

2.4.1.1 Ellis model

Ellis's framework of information-seeking behaviour (Ellis, 1989) is based on empirical research, initially among social scientists but subsequently tested in other groups, including academic researchers (Ellis, 1993), physicists and chemists (Ellis *et al.,* 1993), and engineers and scientists in an oil company (Ellis and Haugan, 1997). It has also been tested by other researchers studying social scientists (Meho and Tibbo, 2003), web users in industry (Choo *et al.*, 2000) and lawyers (Makri *et al.*, 2008a, 2008b).

Ellis reported that the complexities of information behaviour could be described by a small number of different types of activity:

Starting: The initial activities undertaken when seeking information on a topic

Chaining: Following up references cited in sources consulted (backward chaining), or identifying material that cites those sources (forward chaining)

Browsing:	Semi-directed or semi-structured searching in an area of potential interest
Differentiating:	Filtering sources by judging their quality, relevance and other characteristics
Monitoring:	Maintaining awareness of developments in a field of interest
Extracting:	Systematically searching through a source to identify relevant material

After the initial framework had been described (Ellis, 1989), Ellis identified additional activities, notably "verifying" (checking the accuracy of information) and "ending" (completing information seeking activities) (Ellis *et al.*, 1993). There have also been differences in terminology in some studies. In the study of oil company engineers and scientists Ellis and Haugan (1997) used the term "surveying" instead of "starting" and identified the activities of "distinguishing" and "filtering" in place of "differentiating". "Distinguishing" concerns ranking information sources according to their relative importance. "Filtering" is the use of particular search criteria to find information that is as relevant as possible: Ellis and Haugan give the example of using keywords in computerized literature searches.

Ellis refers to his behavioural model as "the relation between these characteristics or components. These can interact in various ways in different information-seeking patterns. It does not represent a set of stages or phases that any or all researchers follow when seeking information" (Ellis, 2005). The model is intended to describe the information-seeking activities of individuals. It does not consider the individual's information needs or the context, such as work environment, in which those needs arise.

2.4.1.2 Kuhlthau model

Kuhlthau's Information Search Process (ISP) was developed on the basis of research in library users, initially school students (Kuhlthau, 1991, 2005). It has since been used in other studies, particularly of students (Hyldegård, 2006; Kuhlthau *et al.*, 2008) but also of some other types of information user including lawyers (Kuhlthau and Tama, 2001) and a securities analyst (Kuhlthau, 1999). Myers (2002) used it as a standard against which other models of information seeking and decision making by health care practitioners were compared.

The ISP model (Table 1) represents information seeking as a process with consecutive stages, whereas the activities represented in the Ellis model do not have to occur in the order shown. Another important difference between the two models is that Ellis's focuses on the information seeker's activities, while the ISP model also considers affective and cognitive aspects (feelings and thoughts) at each stage. The ISP model, like that of Ellis, does not consider the individual's information needs or the context in which they arise.

Stage	Description	Feelings	Thoughts	Actions	Appropriate task
Initiation	A person becomes aware of a lack of knowledge or understanding	Uncertainty	General/vague	Seeking background information	Recognize
Selection	A general area, topic or problem is identified	Optimism, readiness to begin search			Identify
Exploration	Relevant information is sought	Confusion, uncertainty and doubt may occur if inconsistent or incompatible information is found		Seeking relevant information	Investigate
Formulation	A focused perspective is formed from the information found	Increased confidence and sense of clarity	Narrowed/clearer		Formulate
Collection	Information pertaining to the focused perspective is gathered	Uncertainty subsides and interest in the project deepens	Increased interest	Seeking relevant or focused information	Gather
Presentation	The search is completed and the findings are presented or used	Relief and satisfaction if the search has gone well; disappointment if it has not	Clearer or focused		Complete

Table 1. Kuhlthau's Information Search Process (ISP), Kuhlthau, 1991

2.4.1.3 Leckie model

Leckie *et al.* (1996) proposed a general model of information-seeking behaviour that they believed was applicable to all professionals:
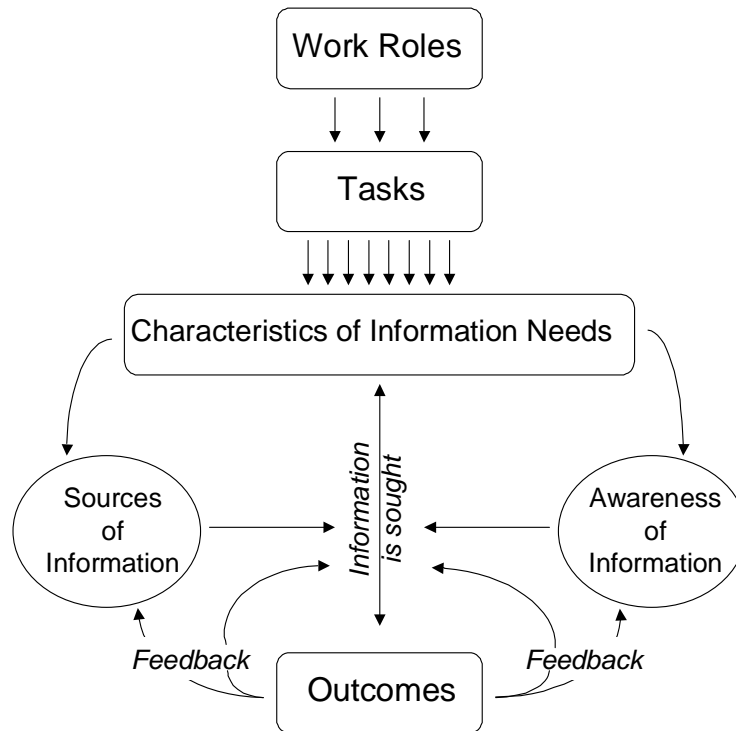
Figure 1. A model of the information seeking of professionals, Leckie *et al.* 1996

This model is based on the authors' review of research into information-seeking behaviour by three professional groups: engineers, health care professionals (nurses, physicians and dentists) and lawyers. The basic model (Figure 1) is quite simple in form. It shows that the roles and associated tasks that professionals undertake in their daily work prompt information needs, which give rise to information seeking. The characteristics of information needs vary depending on the individual's profession, specialization and career stage. They also vary in other ways such as complexity, urgency, predictability (anticipated need or unexpected) and source (internally or externally prompted).

Leckie *et al.* note that professionals assume a multiplicity of roles in their day-to-day work. The pathway followed in seeking information and the information sources used depend on the particular role and associated tasks. The individual's awareness of information sources also affects the path that information seeking takes. Leckie *et*

al. propose the following characteristics of information sources as important factors in this regard:

- Familiarity with and prior success in using a source
- Trustworthiness, or belief that a source will provide accurate information
- Packaging (format in which the information is provided and convenience)
- Timeliness
- Cost
- Quality (this links to trustworthiness, as it concerns accuracy and level of detail)
- Accessibility (ease of use and proximity – this links to packaging)

The authors suggest that accessibility is the dominant factor and that professionals prefer to seek information from the sources that are readily available to them and with which they are familiar. This reflects the principle of least effort (Zipf, 1949). If the initial search does not satisfy the information need, further information seeking may take place, shown as "feedback" in the model. This may involve the use of different sources.

An important feature of the model is that it was formulated on the basis of research in different professions and thus has some general applicability. Also, it has subsequently been employed in a number of studies of information behaviour.

Landry (2006) used it as a conceptual framework to investigate the effect of work roles and tasks on dentists' choice of information sources. The findings confirmed the general features of the model:

- information needs and sources used were related to work roles and tasks, and were affected by intervening factors such as context, urgency and complexity;
- the information-seeking process depended on dentists' awareness of sources and the characteristics of those sources such as familiarity and trustworthiness.

Wilkinson (2001) investigated lawyers' information seeking activities and suggested modifications to the model, including making the organizational context and the individual's demographic characteristics more explicit. In studies of engineering and law students Kerins *et al.* (2004) reported broadly similar characteristics of information seeking behaviour to those described in the model. Referring to these studies, Makri *et al.* (2008b) commented that the broad nature of the model limits its practical value in designing improved information services and systems: "As the

model is presented at a high level of abstraction, there is a significant leap to be made between the identifiable roles that lawyers perform, the tasks related to those roles, the information-seeking behaviour that relates to each task and the design interventions that can be made to support that behaviour."

The model's value in describing information behaviour in broad terms has been demonstrated by these studies, but more detail is needed if it is to give a fuller picture of information behaviour of particular individuals or professions. As Leckie (2005) points out: "The model assumes that the work prompting the roles and tasks takes place within some context which is specific to a particular work position. The larger context was deliberately left unidentified, and it was anticipated that contextual factors (such as the ideology and power relations of the organization), which might have an impact on the work would be sketched in for the particular sites and workplaces being studied."

2.4.1.4 Johnson model

Johnson (1997) proposed a comprehensive model of information seeking (CMIS), which he developed in the context of patients and others seeking information about cancer. He notes that they receive many health-related communications through the media and other "information carriers", but these communications may not meet the receivers' needs. "Communication research and theory have been dominated by a source perspective, primarily related to the field's obsession with persuasion ... the nature and motives of receivers have been downplayed or ignored" (Johnson, 1997, page 170). Johnson set out to redress this by focusing on the perspective of the information receiver or seeker.

The CMIS refers to seven factors grouped under three headings, antecedents, information carrier factors and information-seeking actions (Figure 2).

Antecedents   Information   Information
Carrier   Seeking
Factors   Actions

Demographics

Characteristics

Experience

Actions

Salience

Utilities

Beliefs
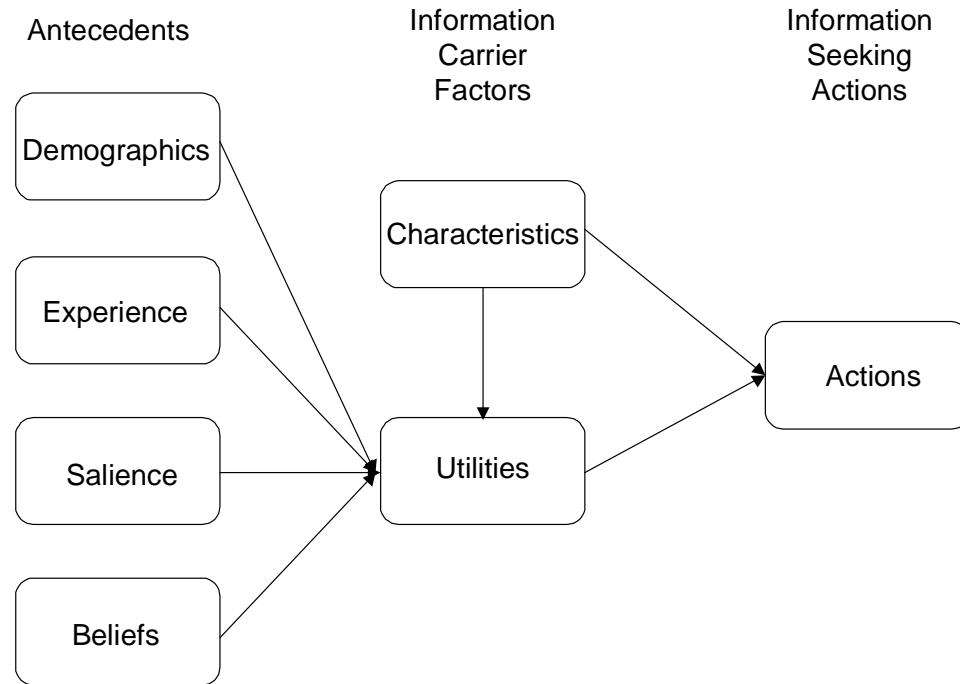
Figure 2. Comprehensive model of information seeking (Johnson *et al.*, 2001)

The antecedents "determine the underlying imperatives to seek information" (Johnson, 1997). According to the model they are:

- the information seeker's demographics – age, sex, ethnicity, education and socioeconomic status;

- the information seeker's experience of the area of interest;

- the salience of information – its personal significance, relevance and applicability;

- the information seeker's beliefs – for example, belief that information exists that can help solve a problem and that he/she can find it (Case *et al.*, 2005)

Johnson's concept of salience as an antecedent needs clarification. The salience of information in terms of its significance and applicability can of course be assessed only after it has been found – the assessment is not an antecedent to information seeking. In discussing salience, Johnson refers to Dervin's sense-making framework (Dervin *et al.*, 2003), and notes that the key factor leading to information seeking is the perception of a gap in existing knowledge. If an individual believes that information can be found that is likely to be sufficiently salient to bridge the gap, this expectation may motivate information seeking. Johnson gives an example of a person who may decide to seek information about cancer: "Salience refers to the personal significance of cancer-related information to the individual. An individual

might wonder, 'Is it important that I do something?' Perceptions of risk to one's health especially are likely to result in information-seeking action" (Johnson *et al.*, 2001). In the model the salience of information influences an individual to seek that information if he/she believes that it is likely to be important and relevant.

Information carrier factors are the characteristics and utility of a particular source which influence an individual's decision to seek information from that source. In considering the characteristics of carriers, Johnson refers to factors such as their credibility and authority and the comprehensibility of the information (Johnson, 1997; Johnson *et al.*, 2001). He notes, however, that ease of access may count for more than credibility and authoritativeness (Johnson, 1997, page 124). Johnson's concept of the utility of an information carrier relates to the relevance, topicality and interest of the information and its usefulness and importance for achieving the user's goals.

The third component of the model, information-seeking actions, involves choosing which source(s) to use and the extent and depth of the search. In discussing how users choose sources, Johnson refers to the uses and gratifications approach from mass communication theory (Baran and Davis, 2003; Windahl *et al.*, 2009), suggesting that the user of mass communication seeks the content that seems to be the most gratifying, depending on the user's particular needs and interests. Thus certain media or information products may be selected in preference to others. Johnson acknowledges that the uses and gratifications perspective suggests that people are active, goal-directed information seekers, which is not always the case. Also, as noted above, ease of access influences the choice of an information source. The model does not describe in any detail the steps involved in information seeking – "The CMIS is oversimplified by design" (Johnson, 1997, page 111).

The validity of the CMIS has also been investigated outside the specific area of cancer information seeking. Johnson and his colleagues used it to study a large state government agency providing engineering and technical services and the findings helped to refine the model (Johnson *et al.*, 1995).

DeLorme *et al.* (2011) studied consumers' behaviour in seeking information about prescription drugs after visiting a doctor and the factors affecting their choice of sources. This was found to be more complex than suggested by the model: "Although our study shows some support for the modified Comprehensive Model of Information Seeking, the results indicate influencing factors vary by information

source types examined, suggesting the model is more complex than predicted."

2.4.1.5 Gorman model

Another model developed in the context of health-related information is that of Gorman (1999), which relates to information seeking by physicians in primary care:
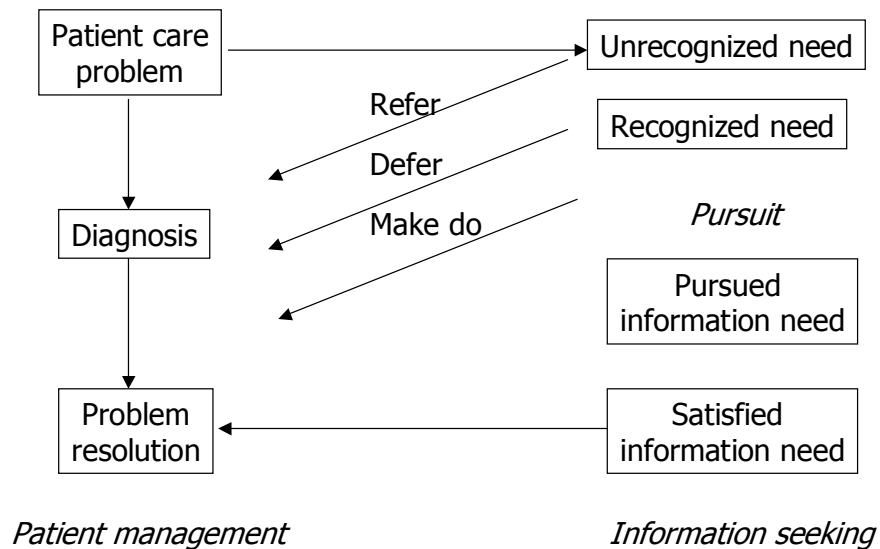
Figure 3. Information seeking in primary care (Gorman, 1999)

The main activity of primary care physicians is patient management. The model sees information seeking as a related but sometimes unnecessary activity: "... the primary goal of the clinician and the patient is not to obtain information but to find some resolution of the patient's health problem" (Gorman, 1999).

At the start the physician is in a state of unrecognized information need. He or she does not know what information will be needed until faced with a specific patient problem. If, when the problem presents itself, the physician is aware that he or she does not have necessary information to deal with it, a state of recognized information need arises. The next stage, pursued information need, occurs if the physician decides to seek the required information. In doing this, he or she makes a choice of which knowledge resources to use. However, the model does not elaborate on the steps involved in information seeking or the resources used. If the information needed to answer the clinical problem is found, the stage of satisfied information need is reached.

Gorman points out that information seeking is only one of the strategies employed once the information need has been recognized, and that only about a third of clinical questions are pursued. Another commonly used strategy is deferral or "watchful waiting" when immediate action is not deemed necessary, perhaps because the patient's problem is not serious and may resolve without treatment. A third strategy is referral to a specialist, in which case the physician does not need to search for information – instead, the specialist is likely to provide information and recommendations on appropriate treatment. The predominant strategy, however, is for the physician to tolerate uncertainty, make do with the information at hand and act on the basis of his/her knowledge and experience.

In an earlier study Gorman found two motivating factors, the urgency of the patient's problem and a belief that an answer to the particular question exists, that significantly increased the likelihood that a physician would pursue an information need (Gorman and Helfand, 1995).

Although this model refers specifically to physicians, it is of wider relevance in highlighting the facts that an information user may have unrecognized information needs and that even when a need is recognized, the user may not actively pursue it.

2.4.1.6 Wilson's models

Wilson's models (Wilson, T.D., 1981, 1999; Wilson and Walsh, 1996) provide graphical representations of information behaviour that take into account factors such as those identified in other models, including contextual, role-related and personal (psychological and demographic) factors. They have been elaborated over many years and have been widely cited (Wilson, 2005), and Wilson's ideas have had a significant effect on the study of information behaviour (Bawden, 2006). They have been used by researchers to study information seeking by, for example, students (Ford *et al.*, 2001), visually impaired people (Beverley *et al.*, 2007) and health care managers (Niedzwiedzka, 2003). Taken together the models identify many of the factors affecting information seeking behaviour and for this reason they are reviewed in detail here.

Addressing the importance of contextual factors, Wilson portrays the information user in his/her "life world" obtaining information from the "universe of knowledge" (Figure 4). Wilson refers to the user's life world as "the totality of experiences

centred on the individual as an information user." The world of work is an important part of this life world and within this there are "reference groups" – fellow professionals, peer groups etc. – with which the user identifies. Among health care providers, for example, the importance of professional colleagues as sources of guidance and information is well established (McKnight and Peet, 2000).

The user is in contact with various information systems through which information resources may be accessed (paths e to k in the diagram), though the user may also obtain information directly without using a formal information system (paths a to d). An information system may include "technology" and a "mediator". When Wilson first described the model he referred to "technology" as a "manual card file, computer terminal, etc." At that time the personal computer was in the early stages of development and the World Wide Web was not available. A "mediator" was "generally a living system, i.e. a human being". Although information professionals may still play the role of mediator, web-based systems with user-friendly interfaces and assisted searches can include both "mediator" and "technology" aspects.
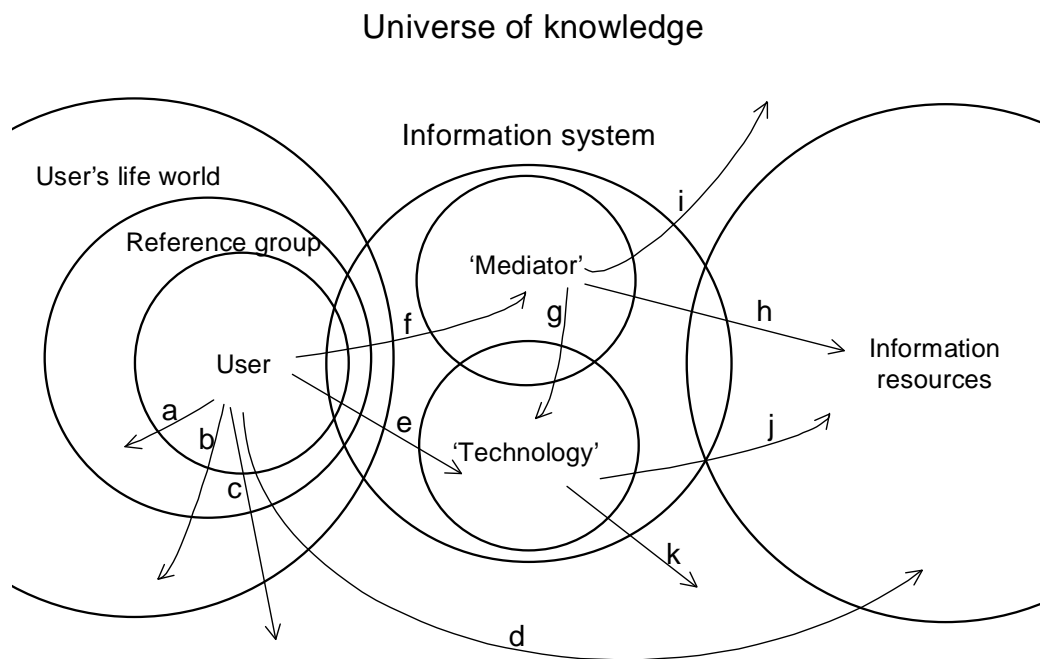
Figure 4. The context of information seeking (Wilson, 1981)

Wilson proposed that the different paths could be examined to understand information behaviour more clearly. If, for example, a user chooses path a to find information, by asking colleagues in his/her reference group, we may wish to know

whether this is because of ignorance of formal information systems or because the user finds it more efficient or effective to do so.

In the same 1981 paper Wilson presented the following model of information behaviour (Figure 5), which he said could be seen as a sub-graph of the above model, centred on the user.
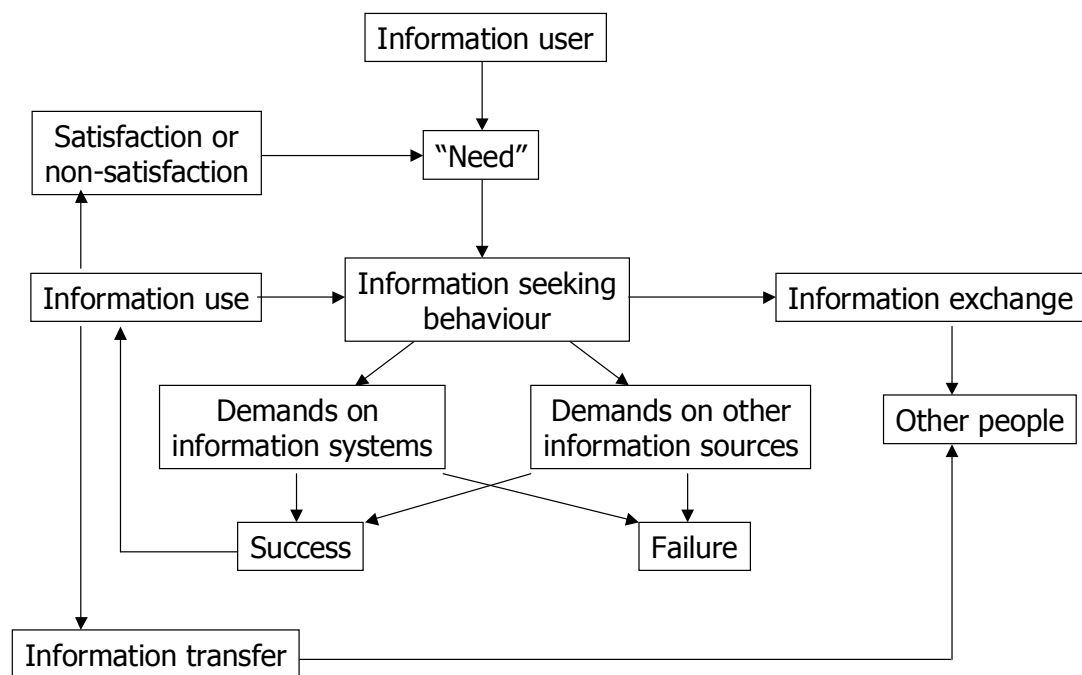
Figure 5. Wilson's 1981 model of information behaviour

According to this model, information-seeking behaviour arises from a need that the user perceives. A person seeking information uses information systems or other information sources. As examples, Wilson mentions libraries, on-line services and information centres (the model was developed before the widespread availability of personal computers and the Internet). Alternatively, a person may seek information from other people and this is shown in the model as "information exchange", with "information transfer" representing the communication of information. If information is found it can be used and may fully or partially satisfy the perceived need, or it may fail to do so, in which case the user may look for further information.

Wilson considered needs and other factors affecting information-seeking behaviour in a third model in the 1981 paper (Figure 6):
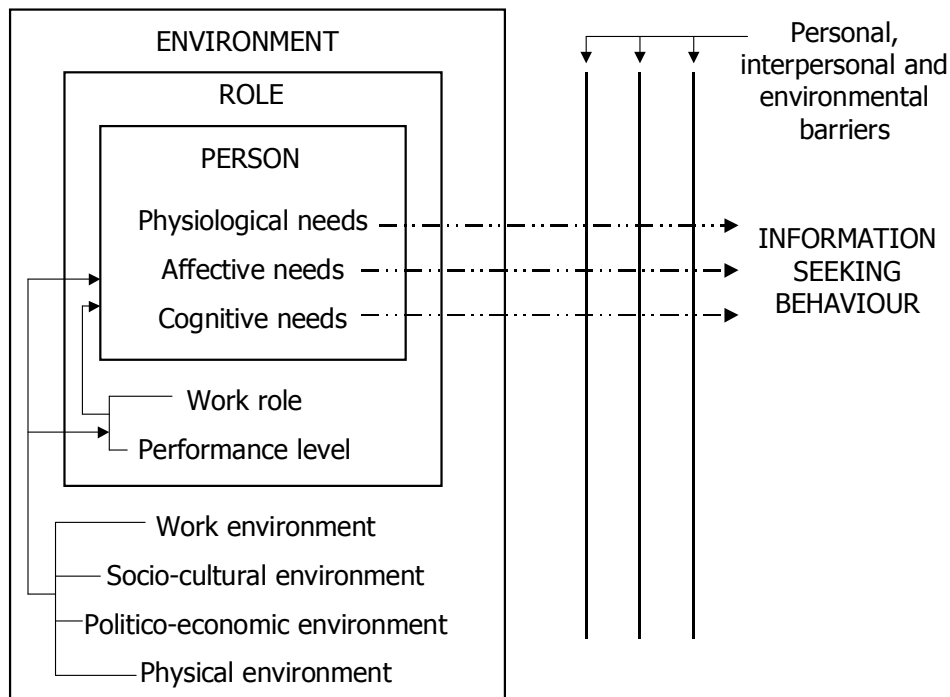
Figure 6. Wilson's 1981 model of information-seeking behaviour

Referring to concepts in psychology, Wilson identified three categories of basic human needs, and suggested that these drive information-seeking behaviour:

- Physiological needs, e.g. for food and shelter
- Affective or emotional needs, such as the need for achievement
- Cognitive needs, e.g. to learn a skill

Wilson suggests that, instead of speaking of "information needs", it may be preferable to refer to "information seeking towards the satisfaction of needs". The model indicates that these needs are affected by the person's environment and role. In the person's work role, for example, "the performance of particular tasks, and the processes of planning and decision-making, will be the principal generators of cognitive needs; while the nature of the organization, coupled with the individual's personality structure, will create affective needs such as the need for achievement" (Wilson, 1981).

The model also indicates that needs by themselves do not necessarily result in information-seeking behaviour. Personal, interpersonal (or role-related) and environmental factors (labelled as "barriers" in this version of the model) may affect or inhibit information seeking. As examples of such factors, Wilson mentions the importance of satisfying the need, failure to (consciously) recognize a need, taking

decisions on the basis of beliefs without full information, and the cost and availability of information sources. Wilson's observation that individuals do not always pursue information needs pre-date Gorman's findings, noted above (Gorman, 1999), that this is the case for physicians. Wilson, like Gorman, also mentions the possibility that needs may be unrecognized: "...neither the need not its satisfaction may be consciously recognized..." but if relevant information becomes available, it "may bring about the recognition of a previously unrecognized cognitive need" (Wilson, 1981).

Wilson subsequently built on these models to produce a revised general model of information behaviour (Wilson and Walsh, 1996; Wilson, 1997):
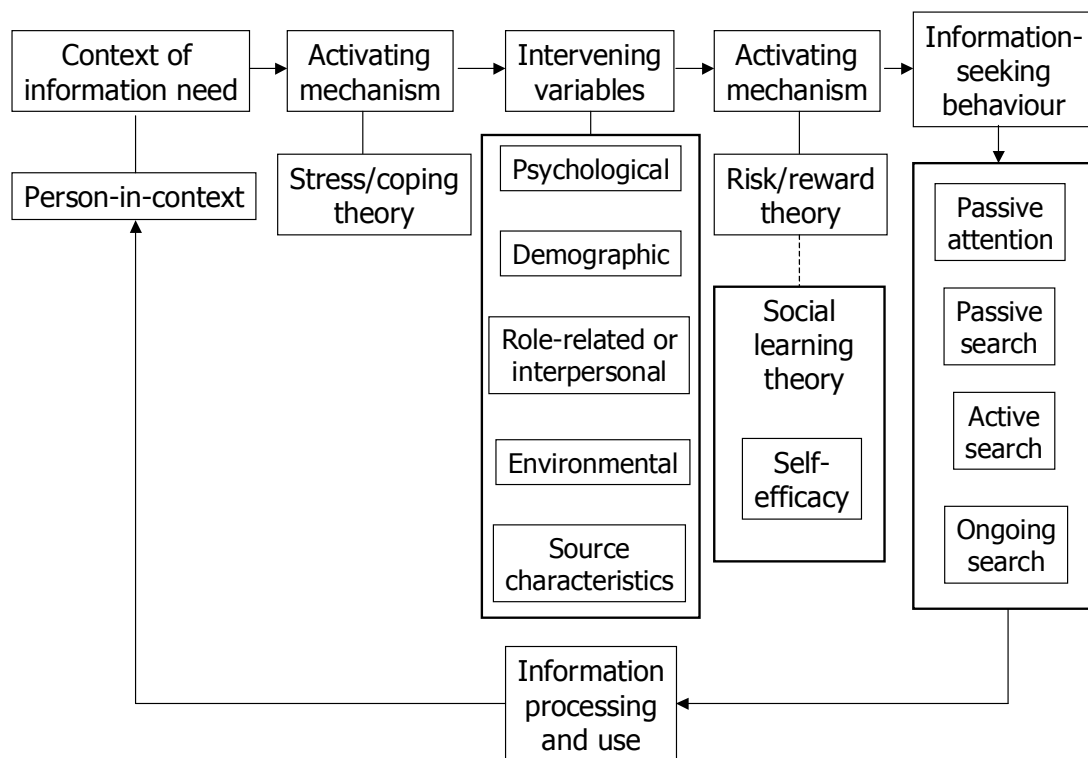
Figure 7. Wilson's 1996 model of information behaviour

This draws on research in various fields, including decision-making, psychology, innovation, health communication and consumer research. The information user is shown as "person in context", echoing the user within his/her life world in the "context" model (Figure 4). As in the earlier information behaviour model (Figure 5), the revised model shows information need leading to information seeking. However, it interposes factors that may affect information seeking, grouped under the

headings "activating mechanisms" and "intervening variables", the latter deriving partly from the "barriers" in Figure 6 but renamed to suggest that they may support as well as inhibit information seeking.

The activating mechanisms refer to the following theories:

- stress/coping theory, which may explain why some needs result in information seeking but others do not – for example, why a patient may seek or avoid health-related information;
- risk and reward theory – for example, a person may be motivated to search for information if the risk of not having it seems high, such as when deciding on a major purchase; and
- social learning theory, which includes the concept of self-efficacy (Bandura, 1977, 1994) or a person's belief in his/her capability to perform a particular task, such as searching a database or information system.

The model shows the following types of intervening variables:

- Psychological
- Demographic
- Role-related and interpersonal
- Environmental
- Source characteristics

Somewhat confusingly, when discussing them in more detail, Wilson (1997) classifies the intervening variables in a different way, using the same major categories as for the "barriers" in Figure 6:

- Personal characteristics
  - Emotional variables
  - Educational variables
  - Demographic variables
- Social/interpersonal and role-related variables
- Environmental variables
  - Economic variables
  - Source characteristics

It is helpful to consider each variable individually in order to understand the model in more detail.

- Psychological factors

Wilson refers to cognitive dissonance as a motivation for behaviour. Thus, "... conflicting cognitions make people uncomfortable ..." and "One of the ways in which dissonance may be reduced is by seeking information ..." (Wilson, 1997). He also suggests that people have different levels of "cognitive need" and that it is this factor that may drive information behaviour. People may also be prone to "selective exposure" or "cognitive avoidance", seeking information that conforms to their existing views and avoiding that which conflicts with them.

- Emotional variables

Wilson notes that emotional factors may act as barriers to information seeking, citing as an example nervousness in patients which may inhibit them from seeking information about their condition.

- Educational variables

Wilson mentions studies of the effect of educational level on health-related behaviour, for example the apparent links between lower educational level and risky behaviour in regard to cigarette smoking and excessive alcohol consumption.

- Demographic variables

Wilson reports evidence that women tend to seek health-related information more than men and that people in lower socio-economic groups use community health and preventive services less than others.

- Social/interpersonal and role-related variables

Interpersonal factors may also affect information behaviour. Wilson gives the example of cancer patients whose information seeking during consultations may be adversely affected by the attitude of the physician. Wilson does not elaborate on role-related intervening variables but Gorman's model (Gorman, 1999) provides an example relating to physicians. After examining a patient, a primary care physician may decide that it is not his/her role to seek further information on treatment but instead to refer the patient to a consultant.

- Environmental variables

Wilson (1997) cites time, geography and national cultures as environmental and situational factors. He refers to time constraints inhibiting information exchange between patients and doctors. Ely *et al.* (2005) reported that lack of time was one of the most common reasons for physicians not seeking information. Wilson does not discuss in any detail the effects of geographic factors on information behaviour but it has been suggested that there are differences in information needs and behaviour between urban and rural populations (Case, 2002, page 278). With regard to national culture, according to Wilson and Walsh (1996), differences between cultures are "particularly significant for the transfer of innovations and the associated information". As an example they refer to the suggestion of Shore and Venkatachalam (1994) that transfer of information technology between countries is likely to be more effective where the cultural gap is smallest.

- Economic variables

Wilson (1997) refers to two categories of economic factors affecting information seeking: the direct costs of searching and the value of the time involved. Time constraints may inhibit information seeking as noted above. The cost of using information sources has also been reported as an inhibitory factor. Masters (2008) for example reported that cost may discourage physicians from using web-based information sources. In the UK, health care professionals have ready, free access to information sources through the NHS (e.g., http://www.ukmi.nhs.uk/; http://www.evidence.nhs.uk/). Free access to such sources may of course reduce the likelihood of physicians using other information sources for which they would have to pay.

- Source characteristics

Among the characteristics of sources mentioned by Wilson are accessibility and credibility. "A fundamental requirement for information-seeking is that some source of information should be accessible. The lack of an easily accessible source may inhibit information-seeking altogether ..." (Wilson, 1997). An information user's *perception* of the credibility of a source is important: "In distinguishing between advertisements and publicity – the former paid for, while the latter is not – Kotler (1991) notes that publicity has higher credibility than advertisements, since the connection between the manufacturer and the

information is not so directly perceived" (Wilson, 1997). Accessibility and credibility are also important elements of the models of Leckie *et al.* (1996) and Johnson (1997).

Wilson (1997) also refers to the channel of communication although he states that this is not strictly a characteristic of a source. He states that interpersonal communication can be more effective than other forms of communication such as the mass media in conveying information about health or safety. Wilson also notes that studies of information-seeking behaviour have often shown that other people are the commonest source of information.

The distinction made in the model between activating mechanisms and intervening variables is not entirely clear since both types of factor can either stimulate or inhibit information-seeking behaviour. The model could be simplified by including the factors shown as activating mechanisms under psychological variables.

Wilson identifies different types of information seeking:
- Passive attention, through which information is acquired without intentional seeking: for example, by watching television programmes
- Passive search: for example, when information is found coincidentally when searching for other information
- Active search, in which a user actively searches for specific information
- Ongoing search, when relevant information has already been found or is known but the user continues seeking information to update or expand his/her knowledge

He points out that the models of Ellis and Kuhlthau concern active search and that they "provide, in effect, an expansion of that box in the diagram" (Wilson, T.D., 1999).

A criticism levelled against the model is that it shows a logical, sequential process, whereas information behaviour in reality may be a back-and-forth, non-sequential process (Foster, 2004; Godbold, 2006; Niedzwiedzka, 2003). This is a problem with any static, two-dimensional representation of a complex process and Wilson himself has pointed out that it is a simplified representation: "The diagram has been simplified by showing the *intervening variables* at only one point, whereas at least some of the variables may intervene between *context* and *activating mechanism*,

between *activating mechanism* and *information-seeking behaviour* and between *information-seeking behaviour* and *information processing and use*" (Wilson, 1997). Moreover, the 1996 model is more complex than its diagrammatic representation shows, for it subsumes the earlier models without showing all of their detail.

It and the earlier models posit information needs as drivers of information behaviour. This assumption, however, is open to question on several counts. For one thing, the concept of "information need" is unclear. Wilson has discussed the difficulty of defining it (Wilson, 1981). He notes that as a need is not directly observable, occurring only in the mind of the person in need, it can only be discovered from the behaviour of or reports from that person. Rather than trying to define and seek evidence for specific information needs, he suggests focusing on "the proximate causes of information-seeking behaviour, if these can be discovered" (Wilson, 1997). In this regard he refers to activating mechanisms such as stress and coping, though as these are also personal experiences, it is not immediately clear how much further they take us in finding "objective" evidence for the causes of information behaviour. More importantly, it is not always the case that information behaviour results from a recognized need by the information user. An information source such as a website may cause information behaviour by stimulating a user's interest. In this case it is not a predefined information need of the user that leads to the information behaviour. Following on from this point, information behaviour in its broadest sense includes communication. The motives of the communicator or information provider therefore also need to be taken into account. For example, in health care, an important role of evidence-based medicine information providers such as NICE is communication of evidence and guidelines about medicines and other therapies. The aim of the communicator is to influence clinical treatment to accord with perceived "best" evidence. It is this that drives the communication/ information behaviour, not simply the user's perception of his/her current information need.

2.4.1.7 Main elements of information-seeking models

These models show that information seeking is prompted by needs that arise in everyday life or in a particular environment such as work. The decision on whether and where to look for information is influenced by:

- contextual factors, such as the work environment;
- the nature of the information need, such as its urgency and complexity;

- personal factors such demographics, experience and beliefs;
- characteristics of information sources such as ease of use, cost and trustworthiness.

Information seeking activities are described in somewhat different ways in different models but not all activities need take place. In Ellis's model, for example, chaining or browsing may not occur if the information seeker quickly finds information that satisfies his or her needs. In Gorman's model, no specific information is sought if the physician decides to defer, refer or make do. Although the activities described in the Ellis and Kuhlthau models are listed in logical sequences, Ellis stresses that the information seeking process is often not a simple linear process. This point is also made in Leckie's model with its feedback loops. Other researchers have put forward models that emphasize the non-linear, non-sequential nature of information seeking (Foster, 2004; Godbold, 2006). The factors identified in Wilson's models reflect and add to those in other models.

2.4.2 LIS models that include information seeking and communication

The models considered so far focus on information-seeking behaviour, but this is only part of information behaviour as a whole. Wilson illustrates this point schematically (Wilson TD, 1999):
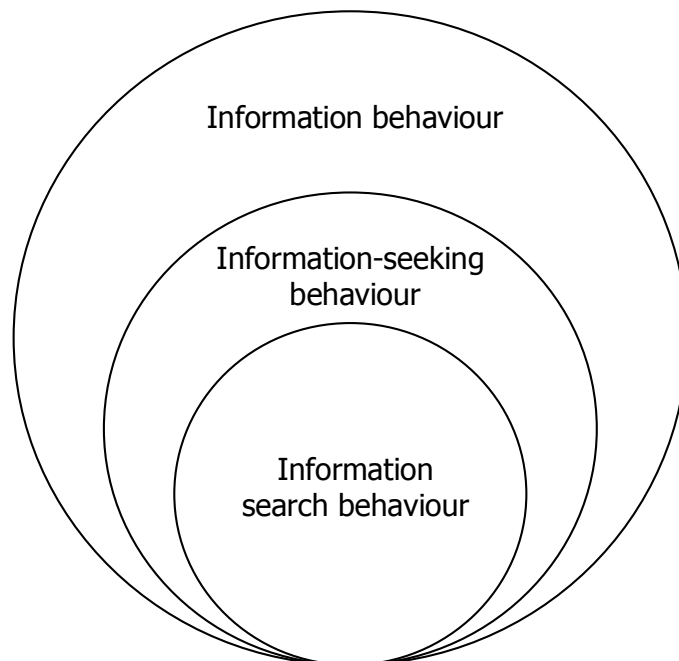
Figure 8. Wilson's nested model (1999)

Information-seeking behaviour can be seen as a subset of information behaviour. Information-searching behaviour, concerned particularly with the interactions between the information user and information systems, is in turn a subset of information-seeking behaviour.

An important element of the wider concept of information behaviour is communication. However, most models of information behaviour from the field of library and information science do not explicitly include communication or do not cover it in any detail. Their focus is on the information user and the user's needs. But as Bao and Bouthillier (2007) point out, "In information-sharing activity, information provider's behavior is not passively driven or solicited by information needs of the user; without information provider's motivations of sharing, information-sharing behavior will not happen."

The widely cited model developed by Krikelas (1983) refers to "information giving", defined as "the act of disseminating messages … in written (graphic), verbal, visual or tactile forms". However, apart from stating that individuals may be both senders and receivers of information, Krikelas has little to say about this aspect of information behaviour.

The models of Wilson (Wilson T.D., 1999) and Ingwersen and Järvelin (2005) show the links between communication and information seeking.

2.4.2.1 Wilson's model of information seeking and communication

Wilson's 1999 model links information seeking to communication, and thus the information provider:
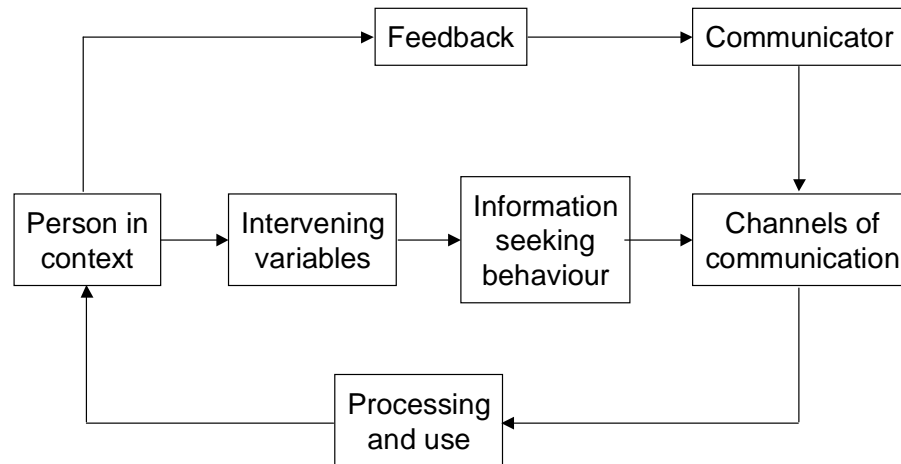
Figure 9. Linking information seeking and communication (Wilson T.D., 1999)

Wilson uses the term "channels of communication" in this model to mean information sources. This differs somewhat from his use of the term as an intervening variable under "source characteristics" in his 1996 model (Figure 7), where it refers to a means of communication such as talking or mass media. Both are different meanings of "channel" from that used in communication theory, where channel refers to the physical means of carrying a signal (Windahl *et al.*, 2009, page 17). This model gives a deliberately simplified view of information seeking, and it is necessary to refer back to the earlier models in order to explore the different elements of information behaviour and the factors affecting it.

2.4.2.2 Ingwersen and Järvelin model

Figure 10 shows one of the graphical representations of the cognitive model of information behaviour developed by Ingwersen and Järvelin (2005). The model focuses on information seeking and retrieval but it includes the various "cognitive actors" involved:
- Authors of information objects
- Information seekers
- Designers of database structures and systems, interfaces, retrieval functionalities etc.
- Human indexers
- Selectors deciding on the availability of information objects (examples mentioned by Ingwersen and Järvelin include journal editors, database producers, reviewers and conference organizers)

- Communities of individuals organized in a social, cultural or organizational context
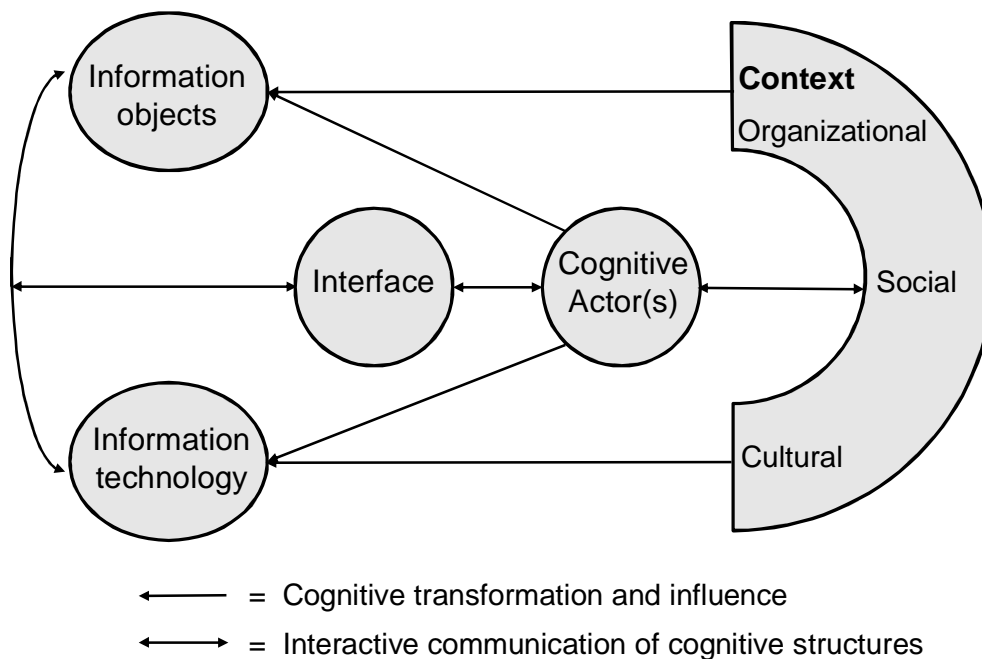
Figure 10. Model of interactive information seeking, retrieval and behavioural processes (Ingwersen and Järvelin, 2005, page 261, Figure 6.1)

The inclusion in this model of information providers (authors), as well as information seekers, and of selectors, system designers and indexers makes it a more general representation of information behaviour than those already discussed. The graphical representation of the model is fairly simple but Ingwersen and Järvelin provide much more detail of the framework and underlying concepts in their written description of it (Ingwersen and Järvelin, 2005, Chapter 6).

One factor of great importance in the model is context. Unlike Leckie *et al.* (1996), Ingwersen and Järvelin refer to the different contexts of the information seeker, the author, the selector and the other actors involved. Authors are influenced by their context to communicate information and the intended meaning of that information is also affected by the context. NICE, for example, which is charged with the responsibility of providing "national guidance on the promotion of good health and the prevention and treatment of ill health" (http://www.datadictionary.nhs.uk/), produces guidelines in order to influence health care professionals' clinical practice. The pharmaceutical industry communicates information through advertising and other means in order to bring its products to the attention of health care

professionals and to increase sales. The recipients interpret the information, and "their context determines the nature of the interpretations that are made" (Ingwersen and Järvelin 2005, page 260). Thus the intended meaning and the received meaning may not be the same. For example, a guideline produced to reflect best clinical practice, which is based on evidence from clinical trials, may not be regarded by a physician as best practice because it does not take into account his/her medical knowledge or the differences between patients in clinical trials and those seen in everyday practice (Feinstein and Horwitz, 1997; Tonelli, 2006). When considering the information activities associated with health care provision, the differences in context between the various players involved – physicians, NHS bodies, NICE, the pharmaceutical industry – need to be taken into account.

2.4.2.3 Dervin's Sense-Making

Dervin's Sense-Making (Dervin, 2005; Dervin *et al.*, 2003) was not developed as a model but as a framework for research, "a conceptual tool of broad applicability for use in understanding the relationship of communication, information, and meaning" (Tidline, 2005). It is included here because it has had much influence on studies of information behaviour, in both communication and LIS disciplines (Tidline, 2005), and because Dervin has summarized its key ideas in the form of a diagram (Figure 11), which can be seen as a model. This representation of Sense-Making shows a person facing a "gap" – a situation that the person needs to make sense of.

As described by Romanello *et al.* (2003), this representation consists of the:

1. "Situation or the time-space contexts within which sense is constructed;

2. Gap or the "information needs," or questions people have as they construct and deconstruct sense while moving through time-space that need bridging;

3. Verbings: sense-making and sense-unmaking of the individual;

4. Bridge or the assemblage of ideas, emotions, attitudes and memories, from the past, present and future moments that the individual constructs to negotiate the gaps and uses to move from one moment to the next; and

5. Outcomes or the information uses or helps and hurts that the individual puts into newly created sense."

CONTEXT:
- power structures and dynamics
- domain knowledge systems
- cultures and communities

OUTCOMES:
- helps, hindrances
- functions, dysfunctions
- consequences, impacts, effects
- future horizons

BRIDGE:
- ideas, cognitions, thoughts
- attitudes, beliefs, values
- feelings, emotions, intuitions
- memories, stories, narratives

SITUATION:
- histories
- experiences
- identities
- past horizons
- present horizons
- barriers and constraints

VERBINGS:
- sense-making
- sense-unmaking

GAP:
- questions, confusions
- muddles, riddles
- angst

SPACE-TIME →

Figure 11: The Sense-Making metaphor:

Moving across time and space, facing a gap, building a bridge across the gap, and then constructing and evaluating the uses of the bridge

(Dervin, 2005 and Dervin *et al.*, 2003, page 238)

Dervin's Sense-Making emphasizes how a person's understanding and handling of information is affected by personal factors and the environment.

Although the "Sense-Making metaphor" (Figure 11) focuses on an individual who seeks information, Dervin developed Sense-Making as a method "to study and implement communication communicatively ... Sense-Making assumes that all communication is designed but that most designs, even when well meaning, are habitual, unstated, and based on transmission assumptions. Sense-Making's intent is to provide general guidance for how to ensure as far as possible that dialogue is encouraged in every aspect of communication campaign research, design, and implementation" (Dervin *et al.*, 2003, page 236). Sense-Making thus emphasizes the importance of two-way dialogue between the information provider and user to ensure that communications are effective in achieving the goals of the provider and meeting the needs of the user.

The Sense-Making framework raises the question of what is meant by information. Dervin challenges the idea that information is a thing that can be transmitted unchanged from one person to another. She dismisses the hypodermic needle metaphor of communication in which information is seen as being injected into people's minds (Dervin *et al.*, 2003, page 37). "Instead of being seen as having an absolute, accurate, isomorphic relationship with reality, information is seen as being a product, a creation of human observing at specific points in time-space. Information has meaning only in the context of the constraints on the human observing that created it. It is relative to its creator and meaningful only in that context." (Dervin *et al.*, 2003, page 200). The relevance of this conception of information to health care will be seen later in this thesis: those who communicate information about medicines to health professionals may need to take into account personal and environmental factors that affect the way in which health professionals interpret and deal with that information.

Further insights into communication as part of information behaviour can be gained from communication theory.

2.4.3 Mass communication and information diffusion models

Various communication theories and models have been developed relating to mass communication – the process of communication by an organization to a large audience (Baran and Davis, 2003; McQuail and Windahl, 1993) – and information diffusion (Rogers, 2003). There have been few if any attempts to link them to LIS models but they can shed additional light on the communication and information behaviour of individuals.

Whereas LIS models typically focus on the information seeker and information-seeking behaviour, communication models focus on the communicator and the effectiveness of the communication process. They often describe one-way communication, directed by the sender, who thus influences the recipient. The focus in such transmission models is on whether the communication produces the effects intended by the sender, rather than on the recipient's situation and needs. This is summed up in Lasswell's (1949) formulation: "Who says what to whom through what medium with what effect?" A number of influential communication models are discussed here, from one of the earliest (Shannon and Weaver, 1949) to one of the most recent (Thackeray and Neiger, 2009). They are not reviewed in such detail as

the LIS models because the primary aim is simply to identify any additional characteristics of information behaviour that are particularly relevant to communication.

2.4.3.1 Shannon and Weaver's information theory

Shannon and Weaver's information theory (1949) is mentioned briefly here as it produced one of the most influential models of communication (Figure 12).
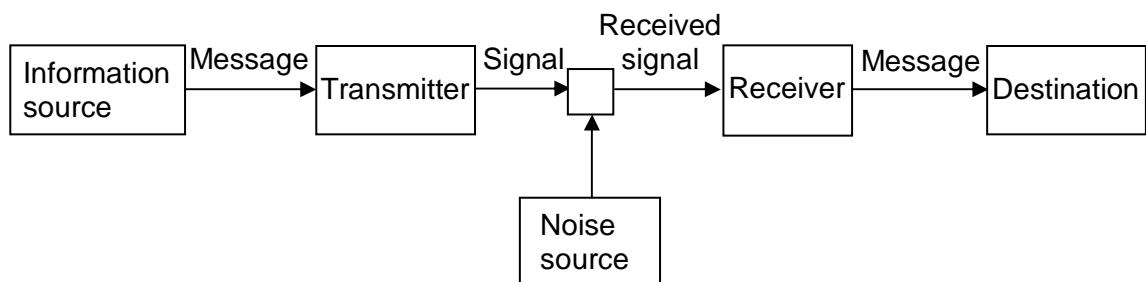
Figure 12. Shannon and Weaver's model of communication (Shannon, 1948)

This model shows communication as a one-way process. The information source produces a message and the transmitter operates on this to produce a signal for transmission over a channel. Shannon's examples of channels included "a pair of wires, a coaxial cable, a band of radio frequencies, a beam of light, etc." (Shannon, 1948). The signal may be disrupted by noise or interference – for example by other signals in the channel. The receiver performs the inverse function of the transmitter, reconstructing the message from the signal. The destination is the person for whom the message is intended. This model was developed in connection with Shannon's work at Bell Telephone as part of a mathematical description of information transmission in telecommunications. It does not overtly take into account the many human factors involved in communication and so it is of limited value in describing information behaviour.

2.4.3.2 Katz and Lazarsfeld model

Consumer research by Lazarsfeld showed that the communication process may not have a direct effect by the communicator on the recipient. Instead, a two-step flow of information may occur (Katz and Lazarsfeld, 1955), whereby opinion leaders

influence other individuals in interpreting communications. This two-step flow process has been shown graphically (Figure 13) by McQuail and Windahl (1993).
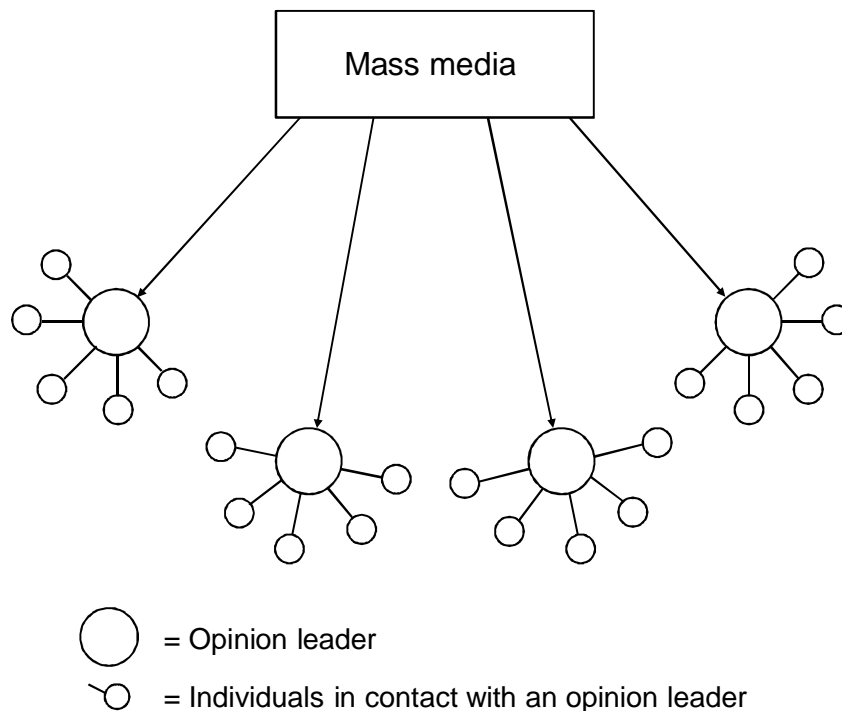
Figure 13. Model of two-step flow of information (Katz and Lazarsfeld, 1955, as represented by McQuail and Windahl, 1993)

2.4.3.3 Rogers: diffusion of innovations model

The role of opinion leaders is also an important element of the model of the diffusion of innovations developed by Rogers (2003). The model concerns the process by which information about an innovation is communicated through certain channels over time among members of a social system (see Figure 14).

Innovators adopt the innovation at an early stage of the process. Opinion leaders, if favourably disposed towards the innovation, influence others to adopt it. Then still more people take up the innovation, followed finally by late adopters or "laggards".

An area in which the role of opinion leaders in communicating about innovations is well established is health care, where authoritative figures such as consultant physicians communicate to other health care professionals and influence clinical practice (Locock *et al.*, 2001). There is evidence to show that they can successfully promote effective clinical practice (Doumit *et al.*, 2007). Opinion leaders are also

used by pharmaceutical companies to influence health care professionals about the companies' products (Moynihan, 2008).

The Diffusion of Innovations
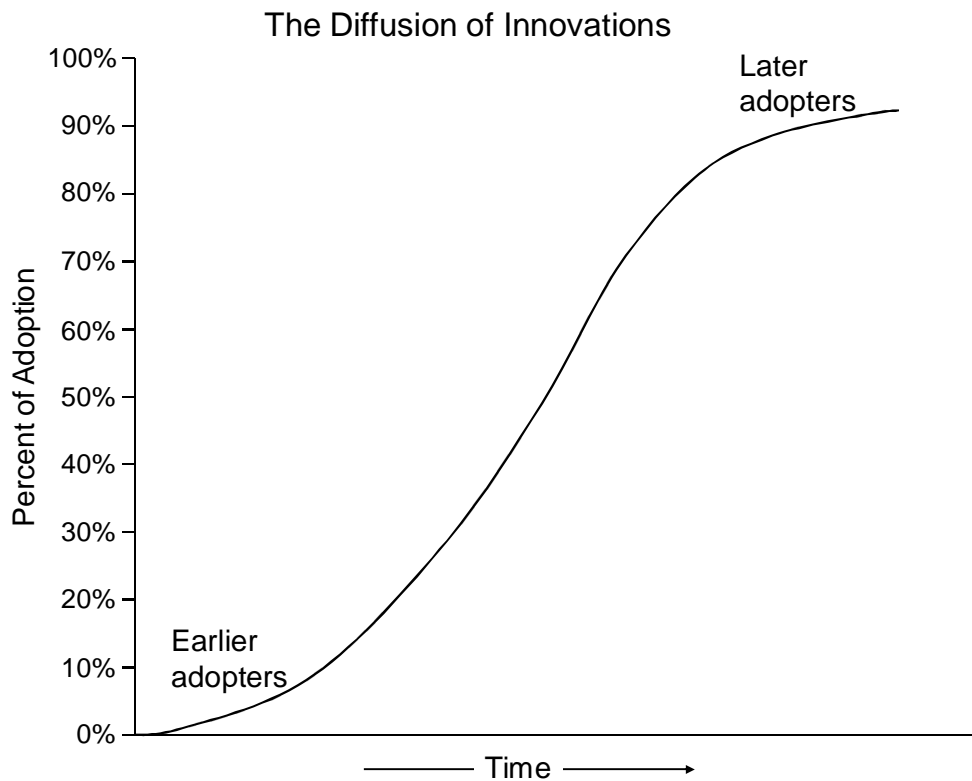
Figure 14. The Diffusion Model of Rogers (2003, page 11)

Rogers emphasizes the principle of homophily in diffusion of innovations. This suggests that people are more likely to be influenced by those who are similar to them (homophilous) than by those who are different (heterophilous). Individuals are homophilous when they "belong to the same groups, live or work near each other, and share similar interests" and "share common meanings and a mutual subcultural language" (Rogers, 2003, page 19). Pharmaceutical companies employ senior physicians as "key opinion leaders" to speak at conferences and influence other doctors about the companies' products (Moynihan, 2008). Such opinion leaders, being practising doctors themselves, are homophilous with members of the target audience and may thus be more effective in communicating with them than sales representatives and other company staff. "Homophily and effective communication breed each other" (Rogers, 2003, page 306).

2.4.3.4 Osgood and Schramm model

Wilbur Schramm (1954, 1997) described a model of communication that he had developed in conjunction with C.E. Osgood (Figure 15).
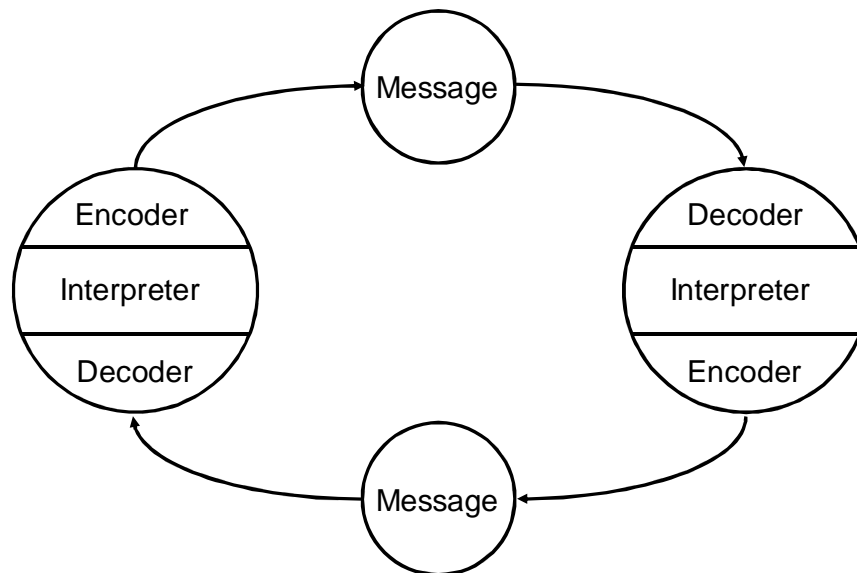
Figure 15. Osgood and Schramm model showing feedback (Schramm, 1997)

This model has similarities to the Shannon and Weaver model in that it shows communication in a rather mechanistic way, in which a message is encoded for transmission and then decoded by the receiver, who then interprets it. A major difference, though, is that it recognizes that communication can be a two-way process involving feedback from the receiver to the originator. Thus both the originator and the receiver can play the role of communicator.

2.4.3.5 Gerbner's general model of communication

Gerbner (1956) proposed a general model of communication intended to have a wide range of applications. He gave a verbal formulation: "Someone perceives an event and reacts in a situation through some means to make available materials in some form and context conveying content with some consequence". Gerbner also produced a graphical representation of the model (Figure 16):
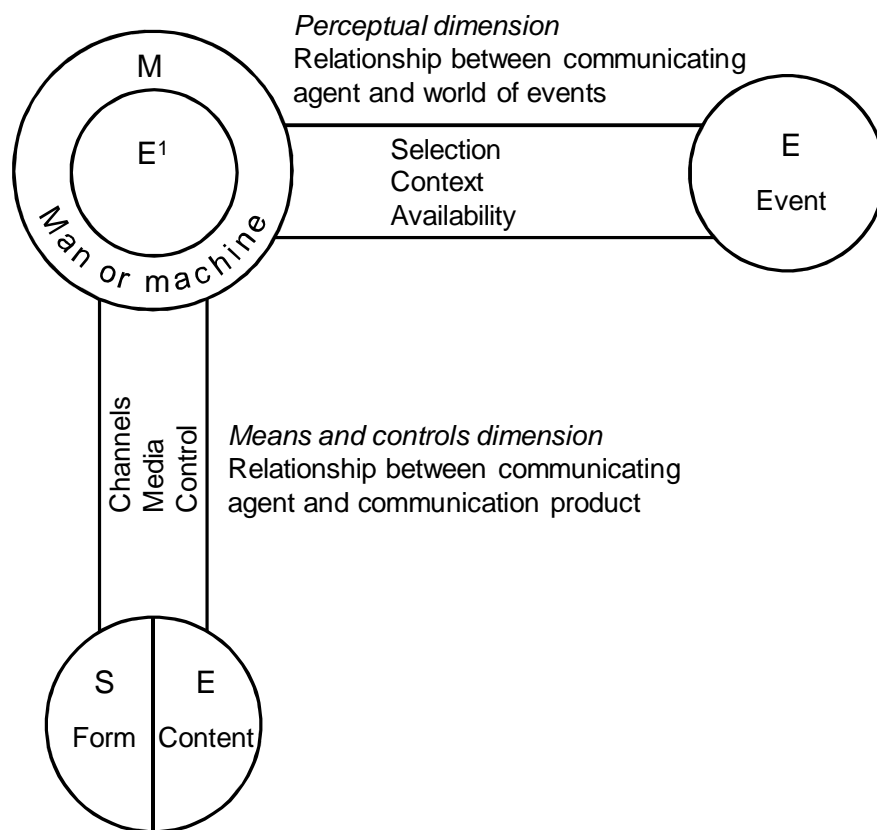
Figure 16. Gerbner's general model of communication (Gerbner, 1956)

An important element that this model adds is the significance that perception plays in communication. When an event, E, occurs, a "perceiver" – labelled M in the model to denote that it may be a person ("man") or a machine (such as a thermostat in a heating system) – perceives it as E^1. This perception, E^1, depends on M's "assumptions, point of view, experiential background and other related factors" (Gerbner, 1956). According to the model, the events perceived by M are determined by M's way of selecting, the context in which a particular event occurs and the availability of each event. M may then communicate about the event to another person by means of a message: SE (statement about event, where S represents shape or form and E represents content). The message is sent through channels or media over which M has a greater or lesser degree of control. Similar factors to those that affect M also affect the recipient. Thus the message, SE, is perceived by the recipient as SE^1, depending on the recipient's assumptions, viewpoint, context etc. As is the case for M, selection, context and availability are also important for the recipient, who may select or perhaps ignore specific messages depending on their

context. Alternatively, messages may not be "available", i.e. they may not reach the recipient. In these ways the model suggests that communication is not a simple transfer of information from source to recipient as implied by the Shannon and Weaver model (1949). Instead, communication depends on selection by the communicator of "events" or information to communicate, the communicator's perception of the events/information and the recipient's selection and perception of the message. It is a selective and subjective process. This model of communication is similar to Dervin's ideas about information and communication in the Sense-Making formulation referred to above (Dervin *et al.*, 2003).

2.4.3.6 Maletzke model

Maletzke (1963) developed a more detailed two-way communication model that takes into account the perspective of the receiver as well as that of the communicator (Figure 17). Just as the model of Ingwersen and Järvelin considers contextual factors for the author and the information seeker, Maletzke's model refers to personal and contextual factors for the communicator and the receiver. Communicators' self-image, personalities, working and social environments and their image of the receivers affect the communications they produce, which may reflect their own and their organizations' aims and views rather than the needs of the receivers (Windahl *et al.*, 2009, pages 162-6). The receivers, on the other hand, react to and interpret communications according to their own context, their self-image, personality and environment. Thus, as will be seen in Chapters 5 and 6, NICE sees itself as independent, but it is part of the NHS and the guidance that it issues is based partly on the NHS requirement that treatments should be cost-effective (Secretary of State for Health, 2005). Arguing from a different perspective, however, health care professionals, patient groups and others have questioned the focus on cost-effectiveness, which may in some cases prevent NHS patients from receiving new drugs (Ferner and McDowell, 2006; Speight and Reaney, 2009).
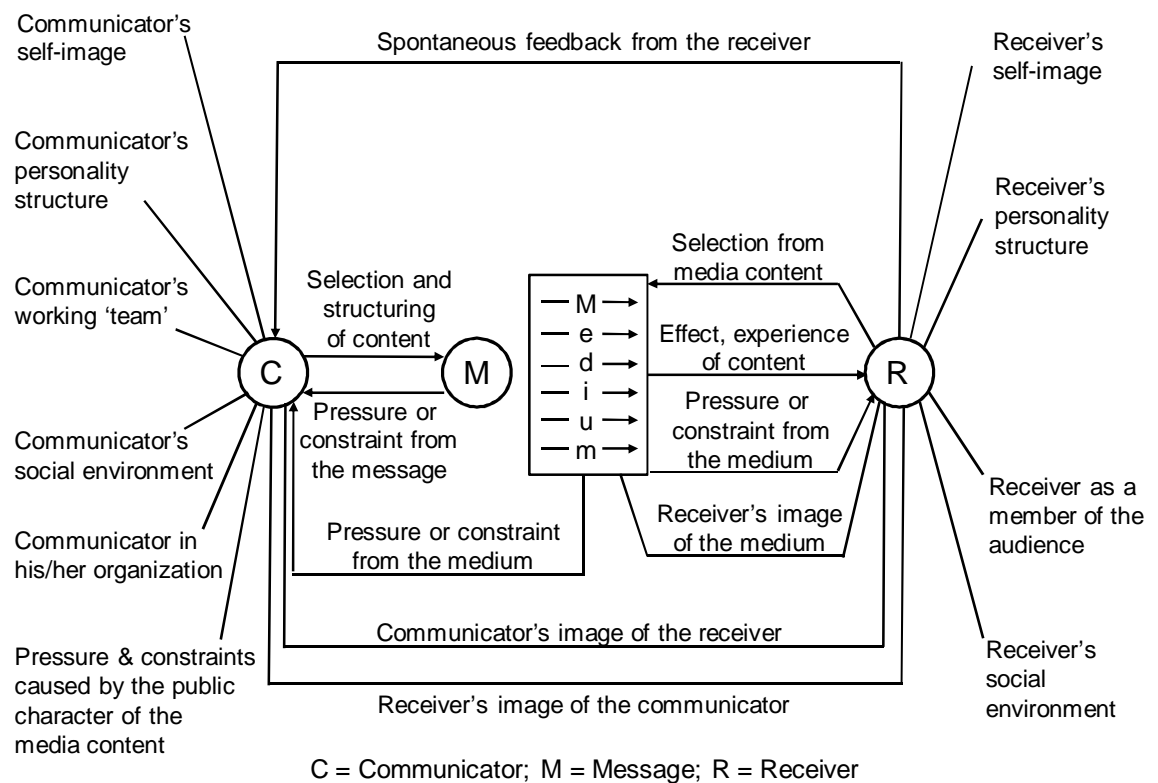
Figure 17. Model of the process of mass communication, Maletzke 1963

Maletzke's model also shows that communications are affected by constraints inherent in the message and in the medium. Companies communicate about their products partly through advertising. The message in an advertisement is constrained in that its aim is to promote the benefits of the product rather than being a full description of its properties. The media or channels used for advertisements also constrain the communication process. Advertisements may appear in journals or on websites, or they may take the form of mailings or of brochures used by sales representatives. The receiver will recognize all of these as promotional channels and may or may not choose to read them. This decision and the receiver's receptiveness to the communication will depend on his or her image of the medium and of the communicator.

2.4.3.7 Thackeray and Neiger model

A recent model of communication behaviour is the Multidirectional Communication Model, which was developed by Thackeray and Neiger (2009) in the context of

marketing to consumers but which has more general application. Thackeray and Neiger comment on the changes that have taken place in communication, particularly since the advent of the Internet and social media: "In the traditional communication process, a sender relays a message through a channel to a receiver... This is referred to as vertical or top-down communication. The consumers, as the receivers, play a less active role." However, "The landscape of sending and receiving information has changed dramatically in the past 25 years. The communication process is changing from being unidirectional to multidirectional as consumers are becoming active participants by creating, seeking, and sharing information using a variety of channels and devices" (Thackeray and Neiger, 2009). To reflect the fact that recipients of communications or information are now often also communicators Thackeray and Neiger developed a model showing the multidirectional nature of communication (Figure 18).
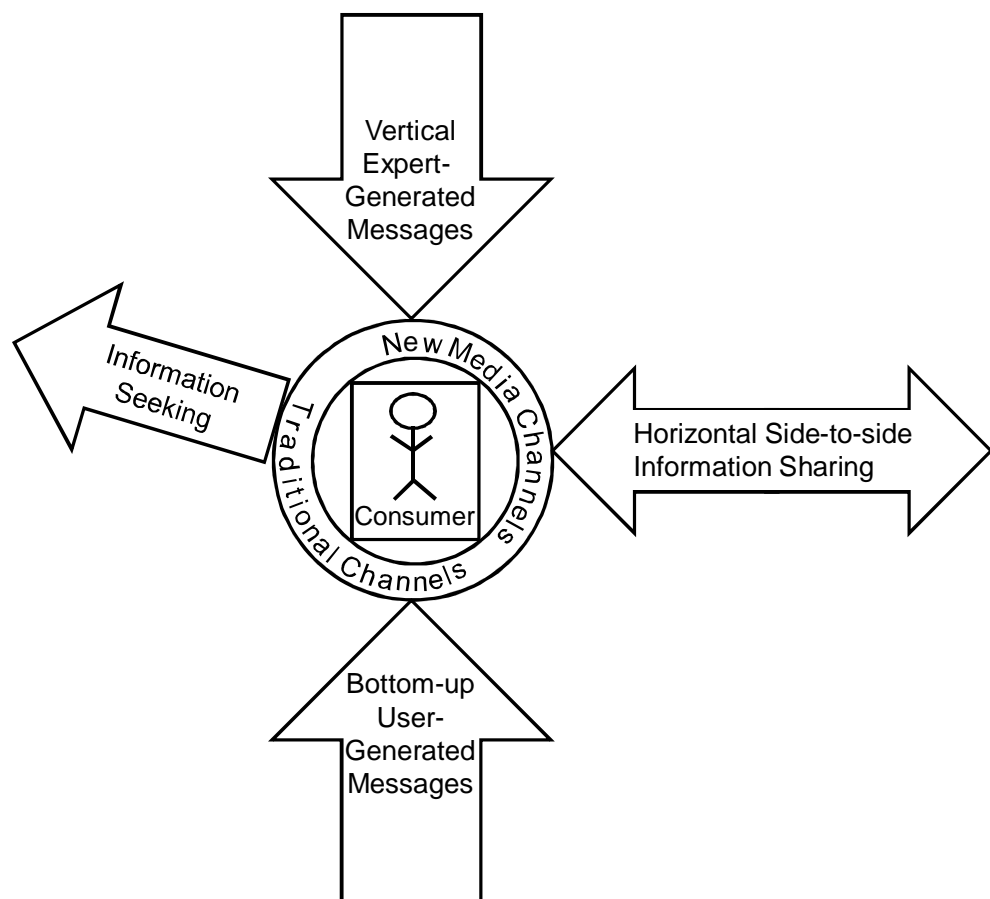
Figure 18. Multidirectional communication model (Thackeray and Neiger, 2009)

Three important features of this model are, first, that communication is shown as multidirectional: the communicator sends information to the consumer or information user and the latter may send messages to the communicator or share information

50

with other users ("Horizontal Side-to-side Information Sharing"). Second, information may be communicated or shared in different ways and through various media, including newer channels such as social media. A third feature, which distinguishes the model from some of the early communication models and which links it to the focus of many LIS models, is that it shows the consumer or information user actively seeking information rather than simply waiting for communications from information providers.

2.5   Key elements of information behaviour

Summarizing what has been discussed so far, information behaviour includes both information seeking and communication. It can be described in terms of the activities of information users and providers, the factors affecting those activities and the sources or information products involved.

Information seeking can be described in various ways, for example Ellis's starting, chaining, browsing, differentiating, monitoring, extracting and verifying, or Kuhlthau's initiation, selection, exploration, formulation, collection and presentation. The activities do not necessarily follow each other in a linear, step-by-step process but may be iterative as suggested in the model of Leckie *et al.* (Figure 1).

Once information has been found it can be processed and used as suggested in Wilson's models (Figure 7). Processing involves some level of assessment of the usefulness of the information to the user. Information that is not judged useable or that does not meet the user's needs may be discarded. The outcome of successful information seeking is often the use of that information to achieve a goal or task such as informing a decision or carrying out an action (Leckie *et al.*, 1996).

The communication process involves an author or information producer creating information products or communications that may be used by the information seeker. It may be a two-step process, with opinion leaders and others playing a role in the communication and diffusion of information (Katz and Lazarsfeld, 1955; Rogers, 2003). As described by Ingwersen and Järvelin (2005), the process may involve other intermediaries in the process, including indexers, designers of database structures and systems, and selectors who decide on the availability of information. Communication today is multidirectional rather than the unidirectional

process described by Shannon and Weaver (1949) as information users themselves create and share information (Thackeray and Neiger, 2009).

A number of factors that affect information behaviour emerge from these models:

- Context:

  The environment in which an information actor (any of the parties involved in information or communication behaviour) operates. This includes location, social influences, culture, activity-related and work-related factors, finances and technology. As an umbrella term, context may also be taken to include personal factors: demographics, expertise and psychological factors, which are defined below.

- Demographics:

  An information actor's age, sex, ethnicity, socio-economic status etc.

- Expertise:

  An information actor's knowledge, education, training and experience relevant to a subject area, task or use of information sources. Expertise also relates to relevant specialization – in education, a career or interest – and career stage.

- Psychological factors:

  An information actor's personality and mental processes including:
  – self-perception and self-efficacy
  – perceptions of others (notably an information user's perception of an information provider and vice-versa)
  – perception of the knowledge gap
  – cognitive dissonance or cognitive avoidance
  – perception of risk
  – ability to cope with stress
  – thoughts and feelings (including those occurring during the information-seeking process as described in Kuhlthau's model, Table 1)

- An information user's needs, wants and goals, prompting the user to seek information:

  These may be internally or externally prompted, recognized or unrecognized, anticipated or unexpected, cognitive or affective.

- An information provider's needs, wants and goals, prompting the provider to communicate information

- Motivating and inhibiting factors:

  Personal characteristics, features of an information need or other factors that encourage or discourage information behaviour.

- Characteristics of information and sources, including credibility, trustworthiness, homophily, quality, accuracy, authority, reliability, lack of bias, usefulness, relevance, timeliness, accessibility and ease of use

None of the existing models explicitly includes all of these features of information behaviour and factors affecting it and so far there has been little attempt to combine the insights from LIS models with those developed in communication theory. As a result of this analysis a new model is presented in Chapter 3 that takes them into account and links information seeking and communication.

Chapter 3

Building a new model of information behaviour

3.1   Introduction

As has been discussed in Chapter 1, the aim of the research described in this thesis is to build on existing theory and research findings in order to develop a new model of information behaviour. The goal is a model that encompasses not just information seeking and the perspective of the information user, or information communication and the perspective of the communicator, but a synthesis of both of these aspects of information behaviour. This approach can be justified by the argument that because so many models have been developed, it is reasonable to assume that together they capture many of the most important features of information behaviour. A new model based on these features should therefore provide a comprehensive picture of such behaviour. If, however, existing models are incorrect or if, taken together, they omit important aspects of information behaviour, the new model may reveal these problems when it is tested.

Chapter 2 has reviewed a range of existing models. In the present chapter the main elements of information behaviour identified from these models are re-examined in section 3.2. The process of building a new model from these elements is described in section 3.3 and the new model is presented. The relationship of the new model to the earlier models is discussed in section 3.4 and its significance is considered in section 3.5.

3.2   The elements of information behaviour

The key elements of information behaviour identified in Chapter 2 may be listed under the following headings:

3.2.1   Information actors

The two broad categories of information actor are (a) information seekers or users and (b) information communicators or providers. These categories describe an actor's role or activity at a particular time.

Information users include:

- those who seek information
- those who have information needs, whether they pursue them or not and whether the needs are recognized or unrecognized (as in Gorman's model, Figure 3)
- receivers of communications, whether or not they actively use the information

Information providers are individuals, groups and organizations that produce, supply or communicate information either proactively or in response to requests, or that facilitate or control access to it. There are many different types of information provider. Some examples are:

- originators or authors of information
- reviewers
- publishers
- colleagues, experts and opinion leaders
- libraries and information centres
- producers and suppliers of databases, websites and other computerized information sources
- official bodies and organizations such as government agencies
- companies

It should be borne in mind that a provider may act as an information seeker in order to find information and then use it to communicate. Conversely an information seeker/user may share or communicate information that he or she has found.

3.2.2 An information actor's personal characteristics

Among the personal characteristics that may affect an individual's information behaviour are demographics, expertise (including knowledge, education, training and experience) and psychological factors. As described in Chapter 2, psychological factors include:

- self-perception and self-efficacy
- perceptions of others, including an information user's perception of a source and an information provider's perception of a user
- perception of the knowledge gap
- cognitive dissonance or cognitive avoidance

- ability to cope with stress

- thoughts and feelings, such as when searching for or providing information

3.2.3 Context

Both information users and providers operate within their own contexts which affect their information behaviour. The environmental context is the living or working environment of the information user or provider. It includes:

- location

- culture and social influences, including friends, colleagues, professional and organizational culture

- activity-related or work-related factors, including role, objectives, tasks and time constraints

- financial constraints

- technology – for example an information user's access to the telephone, television, radio, computer systems and the Internet, and the communication systems available to an information provider

Context may also refer to the personal context of the information actor – personal characteristics such as those outlined under 3.2.2 above.

The environmental and personal aspects of context can overlap and interact with each other. A person's job role, for example, can be seen as part of the environmental context in that it defines what that person does in the work environment. At the same time it is linked to the personal context since performance of a job role depends on personal factors such as training and experience.

These personal and contextual factors have an influence on all aspects of information behaviour. They affect the information user's needs, wants, goals and perceptions, which may motivate or inhibit information seeking. Contextual factors can affect the user's decision on which sources to use by influencing his/her perceptions of particular sources. Personal factors such as knowledge of the subject area and skill in using particular sources affect the information-seeking process. Contextual factors influence the user's assessment of and processing of information, involving perceptions of its relevance, usefulness and credibility, and they affect the actions and decisions that result. Contextual factors and the needs, wants, goals

and perceptions that result from them also affect the information provider's actions and decisions: whether to communicate, what to communicate, for what purpose, how and to whom.

3.2.4 Needs, wants or goals

The reasons for which an information user wishes to seek information or for which a provider wishes to communicate information may be prompted by specific needs or goals that may be related to the environmental context. For example, a user may need to seek information for use in a work context, or a provider may communicate certain information in order to achieve particular goals (such as a company advertising its products with the aim of increasing sales). Information activities may also be prompted by the personal context – for example, a person's desire to increase knowledge about a subject.

3.2.5 Motivating and inhibiting factors

Information needs may prompt information seeking as shown in the model of Leckie *et al.* (1996), but other models suggest that specific motivating factors may come into play when a decision is taken to seek information. Johnson's model includes as motivating factors the salience of information – its anticipated personal significance, relevance and applicability – and the information seeker's belief that information exists that can help solve a problem (Johnson, 1997). Wilson (1997) refers to cognitive dissonance as a motivating factor. Gorman and Helfand (1995) mention two key motivating factors that significantly increase the likelihood of a physician pursuing an information need: the urgency of the patient's problem and a belief that an answer to the particular question exists.

Conversely, certain factors may inhibit information seeking. Wilson (1981) refers to a number of possible "barriers" such as the cost or availability of information sources. Ely *et al.* (2005) reported that lack of time was one of the most common reasons for physicians not seeking information. Personal factors can also play an important part – for example, nervousness in patients may inhibit them from seeking information about their condition; and doubts about self-efficacy or ability may discourage an individual from using an information system (Wilson, 1997).

Motivating and inhibiting factors may also affect the behaviour of information providers. Maletzke (1963) refers to the selection and structuring of content by the producers of mass communication in accordance with their image of the recipients and also to constraints affecting this process. Thus, when promoting or advertising a product, a company may be motivated to select and communicate information that it perceives to be relevant to the target audience and that is likely to influence recipients to choose the company's products. On the other hand it may be inhibited from communicating information that shows a product in an unfavourable light in case it damages the product's reputation. However, other motivating factors such as ethical considerations or legal requirements may override such inhibitions. For example, to meet its commercial goals, a pharmaceutical company in the UK may be motivated in its advertising to communicate information that focuses on the medicine's strengths. It may be inhibited from giving equal focus to the medicine's side-effects for fear of adversely affecting sales, but it will nonetheless be motivated to provide adequate information about side-effects because of the ethical standards that apply in the industry (ABPI Code of Practice for the Pharmaceutical Industry (http://www.pmcpa.org.uk/thecode/) and because of legal requirements such as those laid down in the Human Medicines Regulations 2012: http://www.legislation.gov.uk/uksi/2012/1916/contents/made.

3.2.6   Information activities

These include the information seeking and searching activities described in the various information-seeking models, "information processing and use" as outlined by Wilson (Figure 7 above), and communication as described in the communications models. Information seeking implicitly involves choosing which information sources to use. Information processing involves assessing it – judging its relevance, quality, trustworthiness etc. It may then be used to make decisions, take actions or increase knowledge, or it may be communicated to others. Communication activities may involve processing information to produce information products such those listed in 3.2.7 below. Communication also includes Wilson's concepts of information exchange and information transfer (Figure 5 above).

3.2.7   Information sources and their characteristics

Information sources may be information providers such as those listed in 3.2.1 above or they may be information products.

Examples of information products include:

- literature (journals, books, reviews, guidelines, advertisements etc., which may be in paper or electronic form or both)
- databases
- websites
- blogs
- presentations
- educational materials
- television and radio programmes

Characteristics of information sources that affect their use include such factors as ease of use, accessibility, relevance, quality and credibility.

3.3   The new Information Seeking and Communication Model (ISCM)

An iterative process was used to build a new model of information behaviour linking the various elements described above. First the information actor was considered, depicted graphically as in Figure 19, operating within a particular context defined by the actor's working or living environment or personal characteristics. Particular needs or wants or goals arise from the environmental context or personal characteristics. Motivating or inhibiting factors may influence whether or not the actor engages in information activities to satisfy those needs, wants or goals.

Information Actor
- Context
- Needs, wants, goals
- Motivating and inhibiting factors
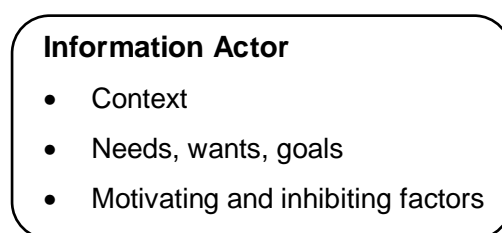
Figure 19. The information actor and factors affecting information behaviour

From this an outline model of information seeking and use was developed (Figure 20) showing an information user in his or her context who may seek information to meet particular needs, wants or goals. The user does this by using one or more sources of information: a person, an information provider or an information product. The user's choice of a particular source will be influenced by its characteristics – its

accessibility and ease of use and the relevance, quality and credibility of the information.
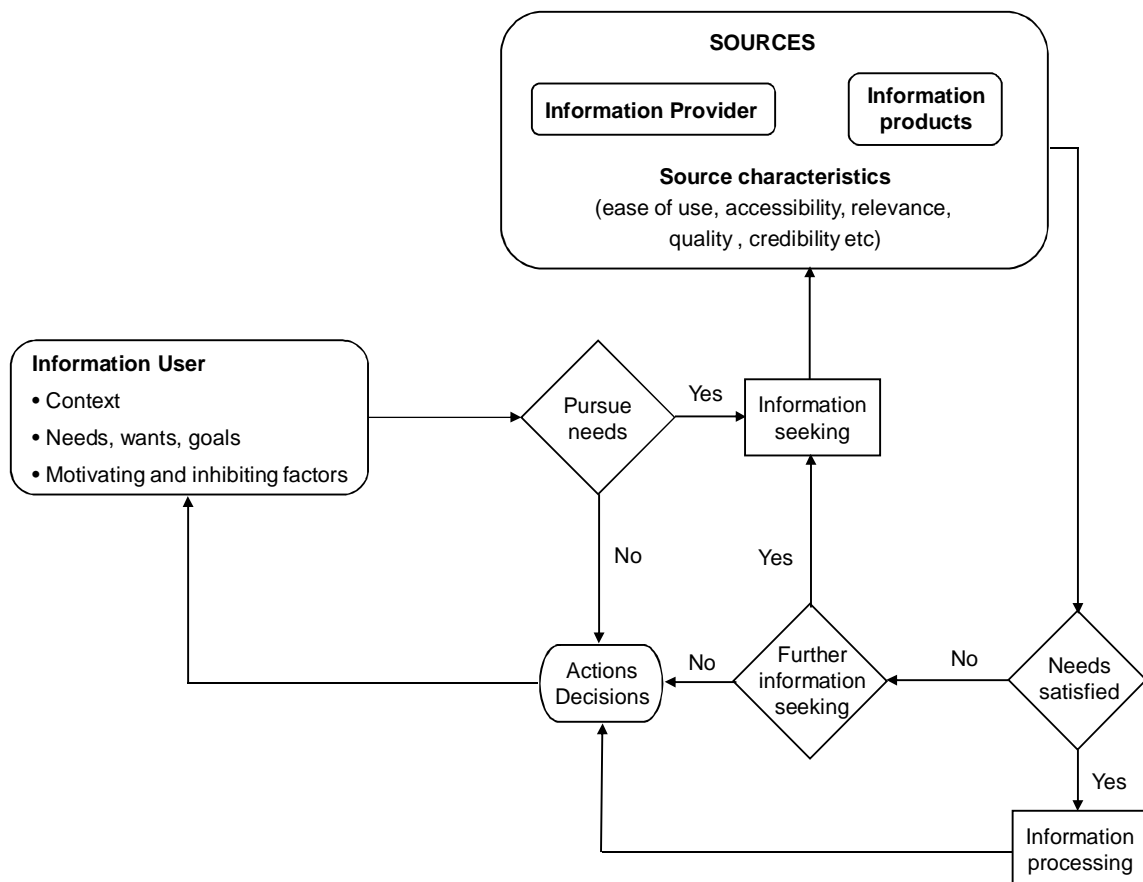
Figure 20. Outline model of information seeking and use

If the user's needs are not satisfied, further searching may take place, perhaps involving other sources. Once the user has found appropriate information he or she may use it, for example to make decisions or to take actions. Alternatively, the user may not be motivated to seek information or may be inhibited from doing so (for example, because of the time or cost involved) and may make decisions or take actions on the basis of information to hand or existing knowledge and experience. The arrow from "Actions Decisions" to the "Information User" box indicates that the actions or decisions taken affect the user: they may lead to new information needs or influence subsequent actions or decisions, and if new information has been found, it increases the user's knowledge.

The next step was to incorporate the communication aspect of information behaviour. Figure 21 is an augmented model showing direct communication by an

information provider to a user through some process or medium such as the Internet, a presentation or a television or radio programme. The provider's context is shown with needs, wants, goals and motivating and inhibiting factors, any or all of which may prompt the provider to communicate or to produce information products such as those listed above under 3.2.7. It was not considered necessary to give details of the process of producing information products since the activities involved include seeking and processing information – in other words, the provider here acts as an information user.
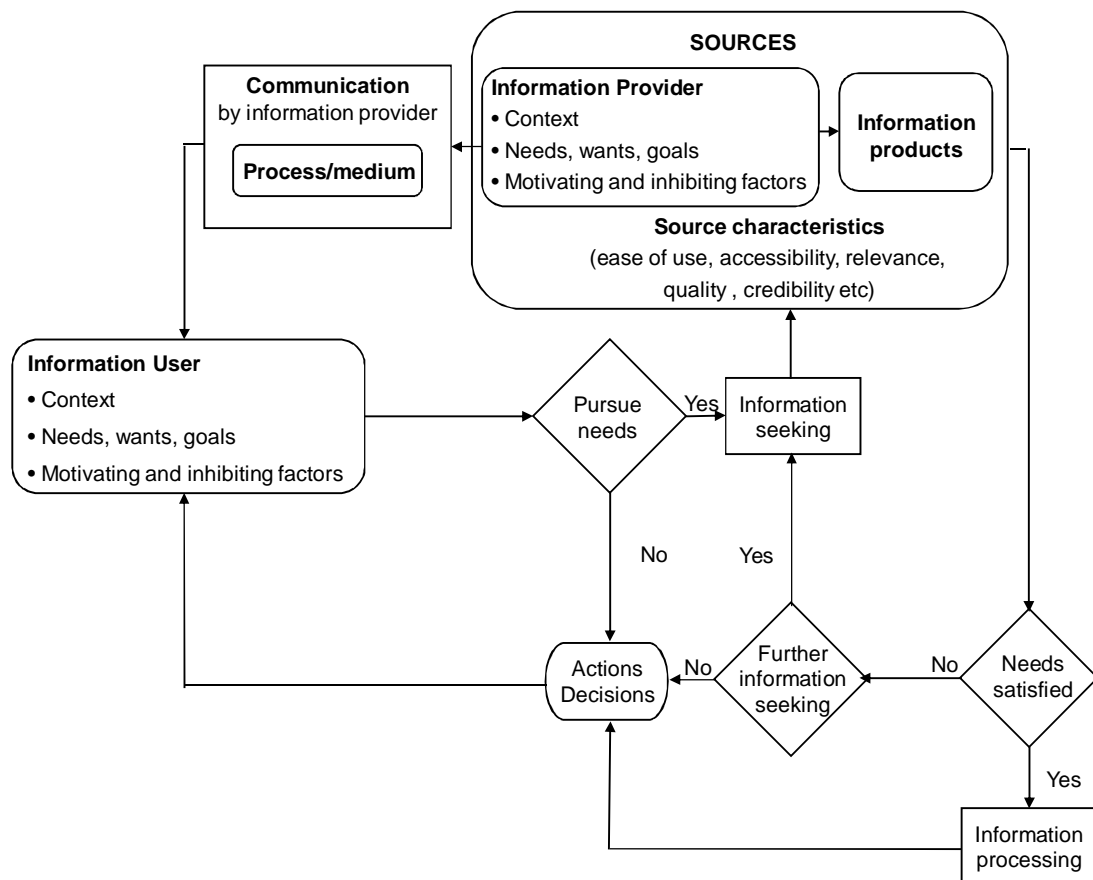
Figure 21. Outline model of information seeking and communication

However, despite its apparent detail, Figure 21 gives only an outline representation of some aspects of information behaviour and so further modifications were made.

As has been noted in Chapter 2 and in section 3.2.3 above, contextual factors have a crucial influence on an information actor's behaviour. Such factors may be environmental, relating to the working or living environment and culture, or they may be personal relating to the expertise, training, perceptions, psychology and other characteristics of a person or group. To illustrate these factors more explicitly the

information user box in Figure 21 was redrawn as in Figure 22 and the information provider box was redrawn in a similar way.
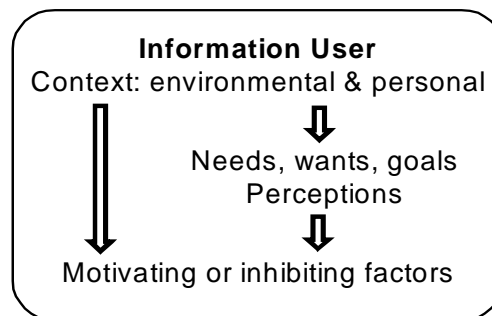
Figure 22. Influence of context on the information user

This shows that needs, wants and goals arise from the environmental or personal context. Perceptions (for example, of self, of others or of information or sources) are also shown because they play an important part in behaviour. As well as arising from an individual's personal, psychological context, they may also be influenced by environmental culture. Motivating and inhibiting factors are also related to context and may be affected by needs, wants, goals or perceptions. Thus an urgent need may motivate a physician to seek information (Gorman and Helfand, 1995) but a self-perception of low technical expertise may inhibit an individual from using an information system (Wilson, 1997). The arrows in the box show the direct links between these various factors.

An important feature of communication is that it is often a two-way process, as in the model of Maletzke (Figure 17), which refers to feedback from the receiver to the communicator, or multidirectional as in the model of Thackeray and Neiger (Figure 18). It is also the case that communications often come from more than one provider or through different media and that an information seeker will use more than one source to find information.

The revised model in Figure 23 takes all of these points into account.
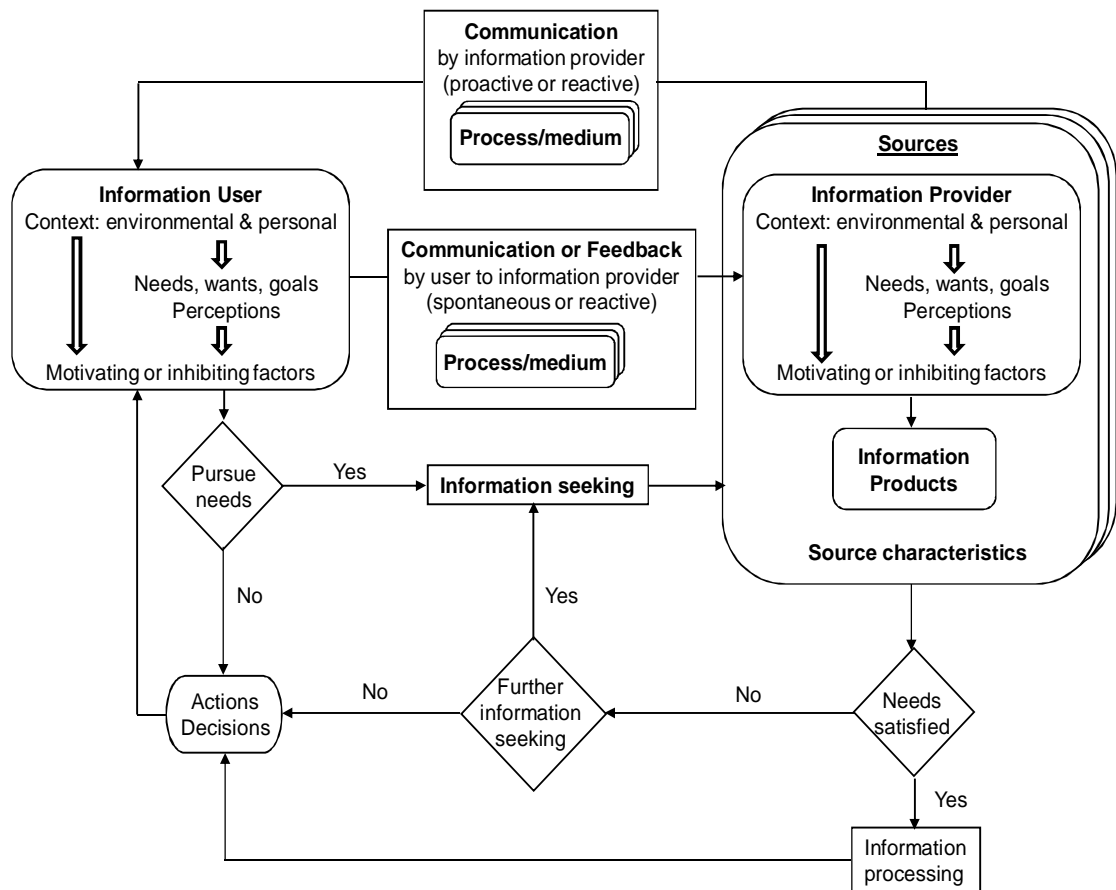
Figure 23. Model of information seeking and two-way communication

The information user and the information provider are shown with their respective environmental and personal contexts, their needs, wants, goals and perceptions, and the motivating and inhibiting factors that may influence their information behaviour. The three "Sources" boxes represent multiple information sources or providers. Two-way communication is shown, from provider(s) to user and from user to provider. This diagram also explicitly shows that communication may be proactive or reactive. For example, a provider may proactively publish material, issue an advertisement or provide information on a website, or provide information reactively in response to a request from a user. Similarly, a user may contact a provider spontaneously with a request or, reactively, respond to a communication. Three "Process/medium" boxes are shown within each "Communication" box to emphasize the fact that different communication media or processes may be used.

The representation in Figure 23 provides little detail about how a user chooses information sources and then processes the information that is found. The user's choice of a source may be influenced by his or her perceptions of the source's characteristics and those of the information available from it.

Hughes *et al.* (2010) refer to three criteria by which users judge information and sources: quality, credibility and cognitive authority (Hughes *et al.*, 2010, page 437, Table 2). For each term Hughes *et al.* list a number of concepts with which it has been associated in the literature, including the following:

- Quality: value, completeness, credibility, accessibility, reliability, usefulness, goodness, currency, accuracy, objectivity.
- Credibility: reliability, perspective, purpose, trustworthiness, expertise, reputation, fairness, accuracy, authority, objectivity, currency, coverage.
- Cognitive authority: trustworthiness, credibility, reliability, scholarliness, how official it is, authority, influence.

They note that there is much overlap in the meaning of these terms, and this is borne out in the literature (for example, Hilligoss and Rieh, 2008; Rieh, 2002; Rieh and Danielson, 2007; Savolainen, 2011; Stvilia *et al.*, 2007). According to the above definitions all three terms include the concept of reliability. Both quality and credibility include the concepts of currency, accuracy and objectivity, and each includes a very similar concept: completeness (quality) and coverage (credibility). Credibility and cognitive authority seem closely linked: both refer to trustworthiness and authority. Both quality and cognitive authority include credibility as an underlying concept.

Because of this lack of clarity in meaning, the use of these three terms in a model of information behaviour is problematic. In particular the term quality is ill-defined, as has been noted elsewhere (Savolainen, 2011). As used by Hughes *et al.* it includes the concepts of credibility, reliability, accuracy and objectivity, which are adequately covered by the term credibility. Most of the other concepts – value, completeness, accessibility, usefulness, currency – relate to the utility of information or a source. Hughes *et al.* also refer to "goodness" as an aspect of quality. This concept derives from a study by Rieh (2002) of scholars' use of the Internet to find information. "Goodness" was a coding term employed by Rieh when analysing transcripts of the comments made by the scholars during searching and in subsequent interviews. It was used to capture comments that the information found or website used was "good", "bad", "excellent", "wonderful", "state of the art" and so on. These terms all relate to the usefulness or utility of information or websites.

Because quality encompasses concepts relating to both credibility and usefulness and because cognitive authority and credibility are closely linked, it was decided to

use the broad terms *credibility* and *utility* in the model to cover the concepts listed above and some others. These two concepts attempt to encompass many of the key factors that influence users' choice of sources and use of information:

- *Credibility* refers to perceived trustworthiness, reliability, accuracy, objectivity, authority, completeness and lack of bias of a source and of information: "credible sources are seen as likely to produce credible messages and credible messages are seen as likely to have originated from credible sources" (Rieh and Danielson, 2007). It also takes into account the concept of homophily (Rogers, 2003), that people are more likely to be influenced by those who are similar to them (homophilous) than by those who are different (heterophilous). The model's conception of credibility thus encompasses concepts underlying both the terms *credibility* and *cognitive authority* as used by Hughes *et al*. It is also compatible with the concepts underlying Meyer's credibility index (Meyer, 1988), which was originally developed for newspapers but has subsequently been used more widely and has been reported to have high validity (McComas and Trumbo, 2001). The five criteria of credibility used in this index are trust, accuracy, fairness, completeness and (lack of) bias.

- *Utility* refers to the usefulness, relevance, importance, timeliness, accessibility and ease of use of information or of a source. It relates closely to the concept of utility used in Johnson's model: "Utility relates the characteristics of a medium directly to the needs of an individual ... For example, is the information contained in the medium relevant, topical, and important for the individual's purposes?" (Johnson, 1997).

Credibility and utility are not absolute properties of information or sources – they vary according to the perceptions and environments of different users and providers. For example, one user may find certain information to be useful and relevant while a different user judges it to be of little value. A user who works in a company that subscribes to a particular information source may consider it to be readily accessible, whereas an individual who has to pay may not be able to afford it. An organization that provides information may perceive it to be reliable but a user may believe it to be biased. Rogers (2003) suggests that users may judge information to be more credible if it comes from a homophilous source such as their own profession or community rather than from another source.

Figure 24 shows the role of credibility and utility in the user's choice of sources and in the subsequent processing and assessment of the information that has been found. It also provides more details of the information-seeking process. This consists of activities such as active searching and Wilson's concepts of ongoing and passive searching. Searching can be broken down if necessary into individual activities, as in the Ellis and Kuhlthau models, and the thoughts and feelings associated with those activities may be described as in the Kuhlthau model. The user may seek information by directly searching information sources or using information products, or by communicating with a provider and asking for information.
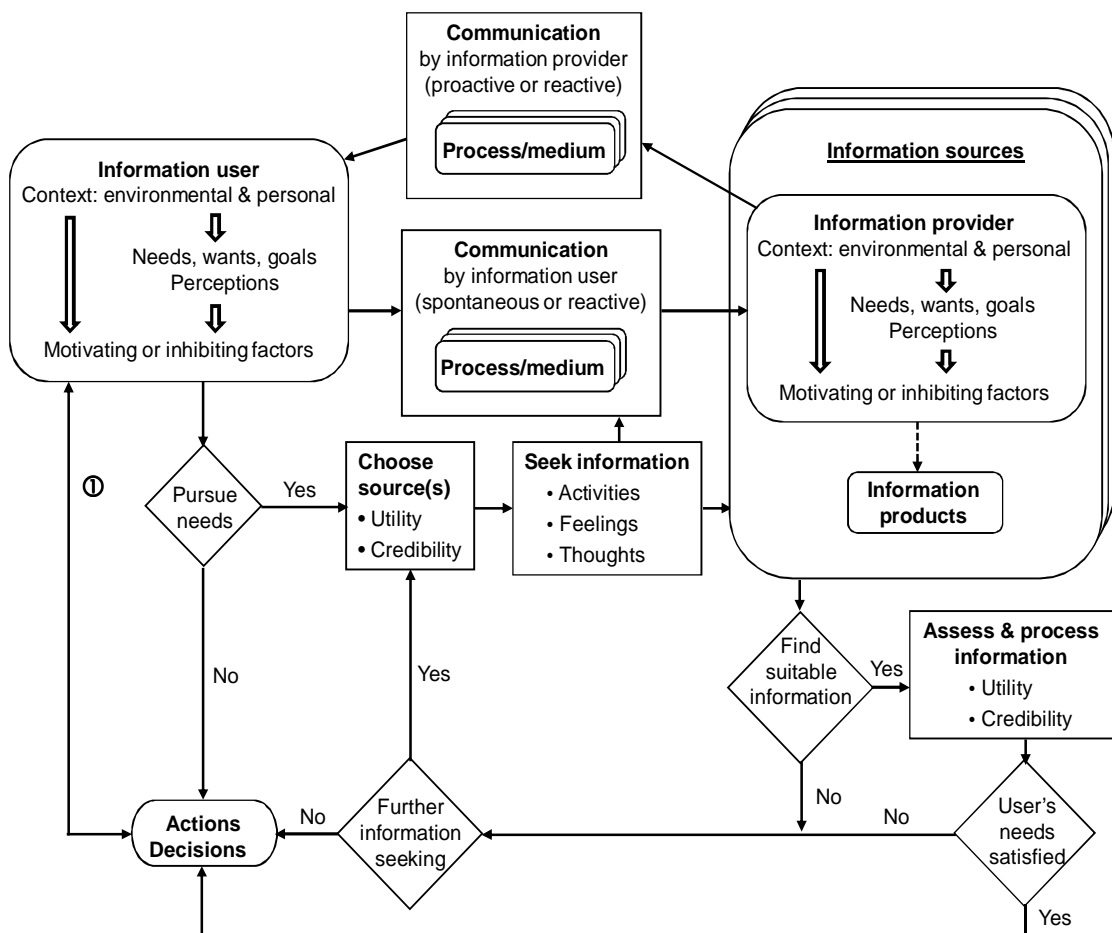
Figure 24. Model of information seeking and communication:
influence of credibility and utility

When information users find information, they can process it, assess its utility and credibility and, if it meets their needs, use it to produce outcomes. Often they will use information to make decisions and take action and these outcomes are

specifically shown in Figure 24. Another outcome may be an increase in knowledge, for example when a student is learning during an educational course, or when a worker seeks information to increase his/her professional knowledge and expertise. This increased knowledge is of course likely to influence future actions and decisions. If users do not find adequate information they can undertake further information seeking, or they can make decisions and take action (or decide to take no action) on the basis of their existing knowledge. The situation may subsequently be reviewed depending on changes in needs, perceptions, motivating or inhibiting factors (arrow ① in Figure 24).

Figure 24 does not give a complete picture of communications. An information user who receives a communication from a provider may assess it, and again the credibility and utility of the information will influence whether it is used. Alternatively, the user may ignore the communication or it may not reach the user. Also, providers may communicate with each other and it would be appropriate to show this more explicitly in a model of information behaviour. Figure 24 was modified to take into account these aspects of information behaviour. The result was the Information Seeking and Communication Model (ISCM) shown in Figure 25.
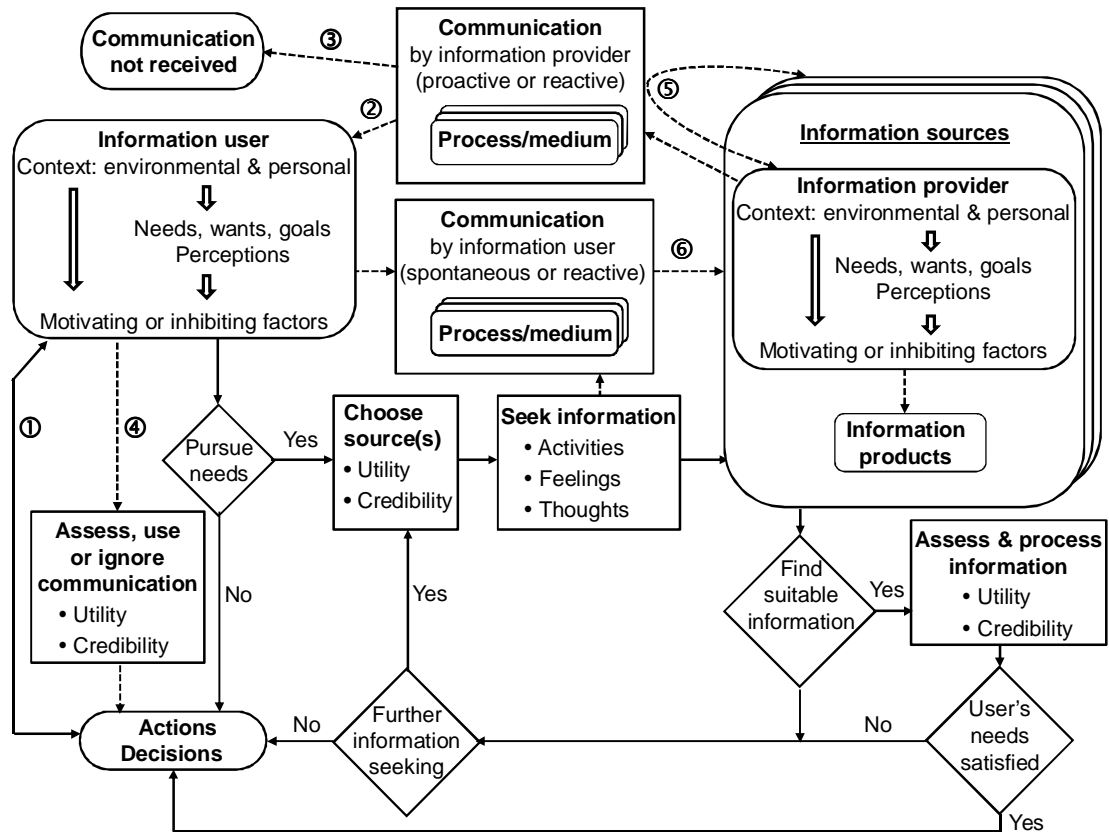
Figure 25. Information-seeking and communication model (ISCM)

Here, the continuous arrows show information seeking and related activities, and the dashed arrows show communication and related activities.

The communication arrow ② in the model represents situations in which providers communicate directly with users – for example:

- broadcasts
- websites and blogs
- communicating by email or through social media such as Twitter
- speakers making presentations at meetings
- official bodies issuing regulations, guidelines and other information products
- companies advertising to potential customers

Communications may not be received by the targeted information users – as shown by arrow ③ in Figure 25. However, when a communication is received (arrow ④) a user may assess the information, use it or ignore it, depending on its perceived utility and credibility. If used, the information may lead to actions or decisions and

these may subsequently be reviewed depending on changes in needs, perceptions, motivating or inhibiting factors (arrow ①).

Information providers may also communicate with each other, shown by arrow ⑤. Thus an opinion leader may receive information from a provider (such as a company marketing a product) and then act as an information provider to others (such as potential users of the product).

As discussed above for Figure 23, communication may be two-way, and an information user may communicate with an information provider (arrow ⑥). This may be done spontaneously, for example when a user asks for information. Alternatively it may be done reactively, such as when a provider requests feedback on an information product or service.

3.4 The ISCM and earlier models

The Information Seeking and Communication Model captures factors affecting information seeking that are identified in other models, including:

- The context of the information seeker in which information needs arise (Wilson's model, Figure 4, Dervin's Sense-Making , Figure 11). Context covers:
  - personal factors such as experience, demographics and psychology (Johnson's model, Figure 2, Wilson's models, Figures 6 and 7)
  - environmental factors such as work role, tasks and culture (the models of Leckie *et al.*, Figure 1 and Ingwersen and Järvelin, Figure 10)

- The influence of perceptions and beliefs on the information seeker (Johnson's model, Figure 2, Dervin's Sense-Making , Figure 11)

- Many of the activating mechanisms and intervening variables in Wilson's 1996 model (Figure 7), which may act as motivating or inhibiting factors

- The processing and use of information (Wilson's 1996 model, Figure 7)

The "Seek information" box encompasses active searching and Wilson's concepts of ongoing and passive searching. Searching activities may include those described in the Ellis and Kuhlthau models, and the thoughts and feelings associated with those activities may be described as in the Kuhlthau model.

The model also encompasses Johnson's notion of salience (Figure 2), which is another motivating factor: if an information user believes that a source will provide useful information, he or she is likely to be motivated to use it. If an information user is not motivated to pursue his or her needs by seeking information, or is inhibited from doing so, he/she may take action on the basis of existing knowledge ("making do" in Gorman's model, Figure 3), or may decide not to do anything ("deferring" in Gorman's model). The situation may subsequently be reviewed, depending on changes in needs, perceptions, motivating or inhibiting factors (indicated by the two-way arrow ① in Figure 25).

The model can also be viewed in terms of Dervin's Sense-Making (Dervin *et al.*, 2003). An individual in a particular context and environment/situation who faces a "gap" – uncertainty, a question or an information need – may seek or receive information. The individual assesses and processes the information to "bridge" the gap and is influenced in these activities by personal and environmental contextual factors, which are shown in Dervin's representation (Figure 11) as domain knowledge systems, cultures and communities, experiences, identities, barriers and constraints, attitudes, beliefs, feelings, etc. By making sense of the situation – finding information to answer his/her question or satisfy the information need – the individual moves to the outcomes, shown in the ISCM as actions and decisions.

Credibility and utility are important influencers affecting a user's choice of sources and judgement of the information obtained. Although their importance has been recognized in the development of other models (Leckie *et al.*, 1996; Johnson, 1997; Wilson and Walsh, 1996), the schematic representations of those models do not explicitly refer to both of them (though that of Johnson refers to "utilities").

The ISCM also takes into account features of information behaviour identified in models of communication. It captures the key concepts of the Shannon and Weaver model (Figure 12) of an information source or provider producing a message that is transmitted over a channel (represented by communication process/medium in Figure 25) to a receiver or information user. "Noise", such as other signals, may disrupt a message in Shannon and Weaver's model. Figure 25 takes this possibility into account by showing several information sources and providers, which may be communicating to the user at the same time. As a result some communications may be ignored.

The ISCM also shows the separate and potentially very different contexts and perceptions of the information provider and the information user and so takes into account Maletzke's model (Figure 17) and that of Gerbner (Figure 16) and his description of communication (Gerbner, 1956).

Communication between information providers, as shown by arrow ⑤, takes into account the two-step flow of information from Katz and Lazarsfeld's model (Figure 13). As noted earlier, this may involve an opinion leader who receives information from a company or other organization and who then communicates it to others. Thus the model reflects the role of opinion leaders from the diffusion model of Rogers (2003).

The model also shows two-way communication or sharing of information as in the models of Osgood and Schramm (Figure 15) and Thackeray and Neiger (Figure 18). An information provider may communicate with a user (arrow ②). Conversely, a user may communicate with an information provider (arrow ⑥).

A feature of the model is that it can be broken down into simpler components, which can in turn shed light on information behaviour. For example, Figure 26 shows this two-way flow of information between provider and user.
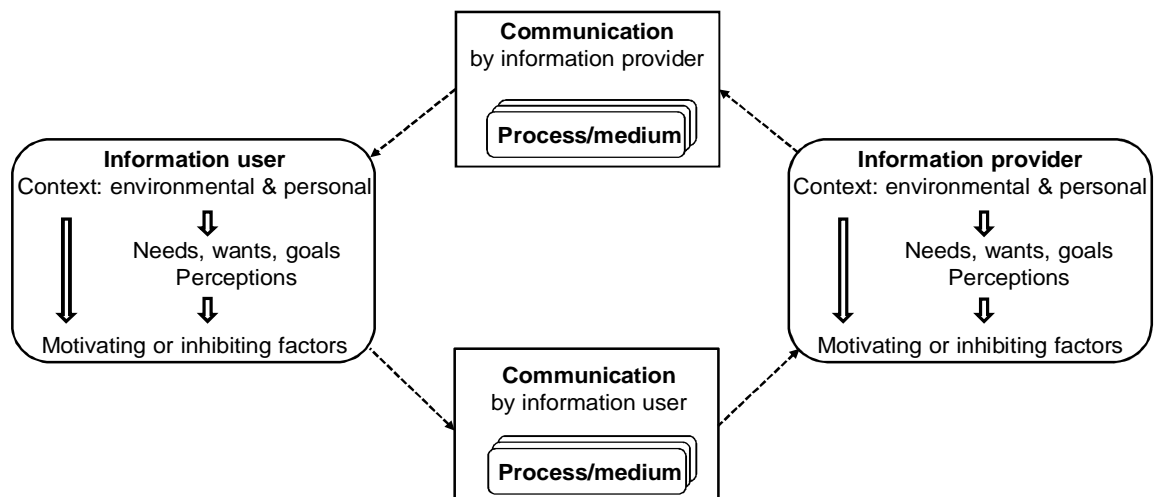
Figure 26. Two-way communication as represented in the ISCM

It can easily be seen from this that provider and user roles are interchangeable: a user can become a provider and vice versa. The two-way flow of information between providers shown by arrow ⑤ in the complete model (Figure 25) is another

way of representing the same thing. The model thus emphasizes the fact that information behaviour can be highly interactive, with users communicating with other users (in their role as providers) and sharing information with each other. This is an important insight from the model: the "information user" depicted in so many LIS models does not play a fixed role but at one point may be a user and at another a provider. Thus in a two-way conversation one person may ask a question (the "user" role) which another person answers (the "provider" role) whereupon the first person responds with his/her views or other information (the "provider" role). This alternation between user and provider roles is of course commonplace in information behaviour – people are both consumers and producers of information or, to quote James Gleick, "We are all patrons of the Library of Babel now, and we are the librarians, too" (Gleick, 2012, page 426). However, this fact is not made clear in most LIS models because of their focus on the user role.

3.5   The significance of the new model

Over many years a large number of studies of information behaviour have been carried out and many theoretical frameworks have been developed. LIS models have focused particularly on the information user whereas models from the communications field have focused on the activities of the communicator or information provider and the means of communication. The new Information Seeking and Communication Model is different from most of the models that have gone before in that it takes account of both the information seeker and the information provider. Its aim is not to list every aspect of information behaviour but rather to show major features which are then open for further, more detailed analysis as appropriate. It shows both the information user and the information provider in their respective contexts, it explicitly includes their separate needs, wants, goals and perspectives and it refers to factors that motivate or inhibit information seeking or communication. It also indicates that their roles are interchangeable in that an information seeker may also be a provider or communicator (Figure 26).

Although some other models also refer to both the information user and the provider, none provides such a detailed analysis as the ISCM. Wilson's 1999 model (Figure 9) includes both information seeking and communication but it provides little detail. His 1996 model (Figure 7) can be used to provide details of the information seeking process but neither this nor Wilson's other models (Figures 4, 5, 6 and 8)

describe the communication process or the context of or factors affecting an information provider. The model of Ingwersen and Järvelin (Figure 10) refers generically to "cognitive actor(s)", who may be information users, providers or others, but it does not depict the interactions between them and the factors affecting their information behaviour. The model of Osgood and Schramm (Figure 15) provides a simple, mechanistic representation of two-way communication between a communicator and a receiver but it gives no details of contextual or other factors affecting them. Maletzke's model (Figure 17) is more detailed than the others and refers to contextual elements for both the communicator and the receiver but it does not provide details of the information seeking process nor does it refer to the assessment and processing of information. The model of Thackeray and Neiger (Figure 18) shows that receivers of information may also communicate or share it. However, although it refers to "information seeking" it does not provide details of the process involved or of the contextual and other factors affecting the communicator and the receiver.

The ISCM therefore provides a more detailed insight into information behaviour than is provided by earlier models. It shows the information user and the provider in their respective contexts, the factors affecting them, the processes of information seeking and communication, and it highlights the importance of utility and credibility in the choice of sources and in the assessment of information. None of the other models explicitly includes all these elements.

The development of the model was stimulated in part by the criticism of research in library and information science that it often fails to build on previous research and theory (Vakkari, 2008; Wilson, T.D., 1999). The ISCM has been formulated by considering a range of existing models that are based on previous research. It thus addresses this criticism of LIS research but it also goes further because it builds not only on LIS models but also on those from the field of communications. Combining insights from the separate disciplines in this way is a unique approach.

A second motivation for developing the model was the criticism that research into information behaviour may have little practical value (Case, 2002, pages 284-287). In answer to this, Chapters 4 to 6 describe the research that has been carried out to investigate the validity of the ISCM and the insights that it provides.

In summary, the ISCM builds on existing theoretical frameworks and is more comprehensive than previous models by explicitly taking into account both the information seeker and the communicator or information provider. Its development is a new approach, combining insights from the different disciplines of library and information science and communication studies, and it thus addresses one of the major criticisms of LIS research. The practical value of the model has been tested as described in the following chapters.

Chapter 4

Testing the new model: information users

4.1   Introduction

In order to test how well the Information Seeking and Communication Model represents real-life information behaviour a novel approach has been used. To investigate the model's relevance to information users, this chapter analyses the information behaviour of physicians as reported in the literature. As noted in Chapter 1, health care is a fertile field for exploration of information behaviour and there have been many studies of physicians' information seeking and related behaviour. The research has been carried out over many years dating back as early as the 1940s and 1950s (Sherrington, 1965) and many reviews of the findings have been published (Coumou and Meijman, 2006; Davies, 2007; Dawes and Sampson, 2003; Detlefsen, 1998; Fourie, 2009; Gorman, 1999; Lacey Bryant, 2000; Masters, 2008; Smith, 1996; Verhoeven *et al.*, 1995). This thesis builds on this extensive body of research. Then Chapter 5 investigates the applicability of the model to the information behaviour of two key providers of information to physicians: the pharmaceutical industry and NICE.

In this chapter, section 4.2 first presents a review of the literature on physicians' information behaviour and examines how the characteristics of that behaviour and the factors affecting it relate to the ISCM. Then, in section 4.3, individual studies of physicians' information behaviour are examined in more detail using deductive content analysis, which is described in section 4.3.1. This technique is well suited for investigating models of behaviour (e.g. Anshel, 2001; Kasila *et al.*, 2003; Purkis *et al.*, 2011) but it has not so far been widely used in library and information science research. It is also used in Chapter 5 to analyse the information behaviour of the pharmaceutical industry and NICE. This is the first time that deductive content analysis has been used to test the validity of a new model of information behaviour in this way.

4.2 information needs and behaviour of physicians: literature review

This section summarizes findings from reviews and individual studies in the literature about physicians' information needs and behaviour and the factors affecting it. The findings reveal that physicians' information behaviour illustrates many of the features of the ISCM. These are discussed further in the following sections. Because these studies concern the behaviour of information users (physicians) they provide relatively little detail about the behaviour of information providers. The analysis therefore focuses on concepts from the ISCM that are relevant to information users:

- The user in context

- The user's needs, wants and goals

- The user's perceptions

- Motivating and inhibiting factors

- Information sources, information providers and information products

- Choosing information sources: credibility, utility and other factors

- Seeking information

- Communication, process and medium

- Assess and process information

- Actions and decisions

4.2.1 The user in context

As suggested by the ISCM, a physician's context plays an important influence on his/her information behaviour. Working in the health care environment, a physician's main role is to treat patients. To decide on a diagnosis and appropriate treatment for a particular patient, a physician needs information, and this need may lead to information seeking behaviour (Gorman, 1999).

Specific needs depend on the particular *environmental* context in which the physician works including job role and whether this is in primary or secondary care, location and health service environment. For example, because of the involvement of hospital-based physicians in clinical research and in teaching junior doctors, they

are more likely to need information related to research and to teaching than is the case for general practitioners (Davies, 2011). General practitioners, on the other hand, more often than hospital doctors, seek information that they can give to patients about their illnesses and treatments (Bennett *et al.*, 2005; Davies, 2011). Specialists need more in-depth information about their specialty areas and so are more likely to research the literature than are generalists (Bennett *et al.*, 2005; Masters, 2008). Physicians in the UK working in the NHS need to know about information and clinical guidelines issued by the National Institute for Health and Care Excellence (http://guidance.nice.org.uk/) to ensure that they give patients the treatments approved as the most appropriate.

A physician's *personal* context also plays an important role in information behaviour, notably his or her experience and expertise. Thus junior doctors tend to need more guidance and background information about diseases and their management, whereas their more senior colleagues tend to ask more specific questions relating to diagnosis, prognosis and treatment (Davies, 2007). Familiarity with technology and having training or lacking training in search skills may affect the decision on whether or not to pursue a particular information need (Andrews *et al.*, 2005; Doney *et al.*, 2005; McCaw *et al.*, 2007).

Further evidence of the influence of context on physicians' information behaviour is given in the following sections.

4.2.2   The user's needs, wants and goals

One of the main goals of a physician is to decide on and implement appropriate treatment for each patient. The physician may have sufficient knowledge and information to decide on treatment based on training, experience and expertise (the personal context represented in the ISCM). Often, however, he or she does not have all the relevant information to hand and so a question arises about the most appropriate treatment of the patient. In a review of physician's information needs Smith commented: "When doctors see patients they usually generate at least one question; more questions arise than doctors seem to recognise" (Smith, 1996). Such questions or information needs include information on the patient, on the condition being treated, on appropriate medicines and other forms of treatment and their efficacy and safety, and logistical information such as the availability of hospital beds (Gorman, 1995). Physicians may also want information for their own interest,

to keep up to date with developments in medicine and clinical practice, to fill gaps in their knowledge, or simply out of curiosity or uncertainty (Lacey Bryant, 2004). There may be unrecognized needs – information that is important to the clinical situation but which the physician either does not know about (Osheroff *et al.*, 1991) or does not realize is needed until a patient presents with an illness for which that information is required in order to make a diagnosis or decide on treatment (Gorman, 1999).

Thus, as the ISCM shows, needs, wants and goals are closely linked to the user's environmental context – as a physician treating patients – and to his or her personal context, including experience, training and knowledge or knowledge gaps.

4.2.3   The user's perceptions

The literature also supports the importance of physicians' perceptions in influencing their information behaviour, as suggested in the model. For example, a doctor may not perceive a gap in knowledge and so may not seek information when it could be relevant to a clinical decision – the "unrecognized needs" described by Osheroff *et al.* (1991). Alternatively, a physician may have a perception that no useful information would be found if a search were to be carried out; this was the most commonly reported reason for physicians not pursuing a clinical question in the study by Ely *et al.* (2005).

Self-perception has been shown to affect information behaviour. Thus self-confidence and self-efficacy have been reported as important factors in the willingness of health care professionals to use information technology to search for information (Fourie, 2009).

Physicians' perceptions of sources and information providers and of their trustworthiness also have a major impact on their information behaviour, as described in section 4.2.6 below.

4.2.4   Motivating and inhibiting factors

In many cases physicians do not actively seek all the information that they need: studies suggest that they may pursue only about a third to a half of the questions that arise when caring for patients (Covell *et al.*, 1985; Ely *et al.*, 2005; Gorman and

Helfand, 1995; Gorman *et al.*, 2004). In a study of 48 physicians Ely *et al.* (2005) reported that the most common reasons why they did not seek information (inhibiting factors) were:

- Doubt about the existence of relevant information
- Referral to another clinician
- Lack of time
- Question not deemed important enough
- Uncertainty about where to look for information

Reviewing the research on the information behaviour of doctors published between 1996 and 2006, Davies (2007) reported the following barriers that inhibited information seeking:

- Lack of time
- Issues with IT or online resources
- Limited search skills
- Cost
- Lack of interest or urgency

In a review of the literature on doctors' use of the Internet, Masters (2008) found a number of factors that discouraged its use, including:

- Time constraints
- Workload
- Cost
- Too much or confusing information
- Security issues
- Lack of skills

Similar findings have been reported in other studies (e.g. Dorsch, 2000; Tan *et al.*, 2006).

Gorman and Helfand (1995) found two factors that significantly increased the likelihood that a physician would seek information (motivating factors): the urgency of the patient's problem and a belief that an answer to the particular question exists. The latter again demonstrates the importance of perceptions in information behaviour.

The evidence from the literature thus demonstrates the importance of motivating and inhibiting factors in pursuing information needs as shown in the ISCM. It also endorses the model's depiction of motivating and inhibiting factors as being intimately linked to the user's context. Lack of time, workload, the availability of other clinicians for referral, cost considerations, urgency of the patient's problem, and IT and online resources can all be seen as part of the physician's environmental context, while search skills, lack of interest, and perceptions such as belief or doubt that information can be found relate to the personal context. Information overload (Bennett *et al.*, 2005; Masters, 2008) when using online sources may be related to personal or environmental contextual factors – for example, poor search skills in failing to narrow down a search to the most relevant material or lack of time when there is a large amount of relevant information that needs to be analysed.

4.2.5 Information sources, information providers and information products

Doctors use or say that they use a wide variety of information sources in their day-to-day work (Bennett *et al.*, 2005; Davies, 2007; Dawes and Sampson, 2003; de Lusignan, 2003; Smith, 1996). These sources include information providers and information products:

- Colleagues and other health professionals
- Patients
- Textbooks
- Journals
- Meetings and continuing medical education
- Computer-based sources
- In the UK, information services and systems provided by the NHS
- The pharmaceutical industry (representatives and advertising materials)

Ebell (1999) describes a physician's information behaviour thus: "As physicians, we gather information from patients in the form of answers to questions, patient stories, physical examination maneuvers, and test results. We integrate that information with what we already know about our patient, his or her family and community, and information from original research, colleagues, textbooks, and other sources".

Variability in study methods and findings makes it difficult to draw firm conclusions about the importance and level of use of different sources. For example, studies in

which health professionals are asked to self-report on their information seeking usually show more use of published sources than of advice from colleagues, whereas observational studies tend to show that colleagues' advice plays a more important role (McKnight and Peet, 2000).

McGettigan *et al.* (2001) investigated the importance of different sources of information about drugs to general practitioners and hospital doctors in Ireland. The general practitioners rated the Drug and Therapeutics Bulletin (an independently produced review of drugs and other therapies) and articles from medical journals as their most important sources. Other important sources included other medical publications, primary care colleagues, recommendations from hospital colleagues, clinical meetings and, for new drugs, pharmaceutical companies' representatives. Hospital doctors rated the British National Formulary and senior colleagues as their most important sources. Also rated highly were medical journal articles, other specialist colleagues and, for new drugs, hospital clinical meetings. However, when asked to name the last drug they had prescribed and the source from which they first obtained information about it, the general practitioners cited pharmaceutical company representatives and hospital colleagues as the most common sources (used in 42% and 36% of cases, respectively). Hospital doctors cited senior colleagues and representatives most frequently (used in 27% and 18% of cases, respectively). These findings suggest that although physicians recognize the value and importance of the medical literature, in practice they often obtain information from people rather than journals and other publications (in the words of the title of this report, "Prescribers prefer people"). They also show the significant role played by pharmaceutical company personnel as sources of information.

Many of the studies of physicians' information behaviour were carried out before the widespread use of personal computers and web-based information resources. Today a wide range of information is readily available to physicians through the Internet (Hersh, 2009), and the NHS also provides information systems and web-based resources for health care professionals, such as:
- NHS Evidence Services (https://www.evidence.nhs.uk/);
- the Medicines and Prescribing Centre at NICE – formerly the National Prescribing Centre (http://www.nice.org.uk/mpc/);
- the Health & Social Care Information Centre (http://www.hscic.gov.uk/); and
- UK Medicines Information (http://www.ukmi.nhs.uk/).

Masters (2008) carried out a systematic review of published surveys of doctors' use of the Internet to investigate its impact. Of 38 such studies published between 1998 and 2004, 29 were from North America, eight were from Europe, including three from or involving the UK (Gjersvik *et al.*, 2002; Moffat *et al.*, 2001; Wilson S.M., 1999), and one was from New Zealand. The findings showed that between 60 and 70 per cent of doctors had Internet access. It should be borne in mind that the studies covered the period from 1998 to 2004 and access increased over this time. Much of doctors' Internet activity focused on searching the medical literature, accessing online journals and bibliographic information, searching for patient-specific information, and using email, but there was a range of other activities.

Social networking applications are increasingly being used by physicians, particularly younger doctors and those in training (Black *et al.*, 2010; Mansfield *et al.*, 2011). A survey of hospitals in 13 European countries showed that social media such as Twitter, Facebook, LinkedIn and blogs were used to a greater or lesser extent in 11 of the countries (Berben *et al.*, 2011). Physicians may use social media to share information with each other, and the value of such media in the education of health professionals is increasingly recognized (Chu *et al.*, 2010). However, as with other information activities, time constraints and lack of familiarity with the technology can inhibit the adoption of social media by physicians (Bacigalupe, 2011).

The literature on physicians' information behaviour has relatively little to say about the information provider's context. Commentators have remarked on bias in information provided by pharmaceutical companies because of their commercial goals (Cardarelli *et al.*, 2006; Lexchin, 1993, 1997; Shaughnessy and Slawson, 1996). However, unsurprisingly, this literature does not provide detailed information on or analysis of providers' information behaviour and the factors affecting the communications and information products that providers produce.

4.2.6   Choosing information sources: credibility, utility and other factors

Contextual factors affect physicians' choice of information sources. From a review of the literature, Gruppen (1990) identified the following factors:

- Personal characteristics such as age, experience and specialty

"Younger physicians appear to make greater use of medical literature and of colleagues than did their older counterparts. In contrast, older physicians more often used pharmaceutical representatives...".

- Practice characteristics and physician's role

"Physicians in institutional practices (medical schools and full-time hospital staff) used colleagues more often than did those in solo or group practices ... those in group practices more often cited informal discussions with colleagues than did their colleagues in solo practice".

With regard to the physician's role, "specialists used journals and discussions with colleagues more often in deciding to change their drug-prescribing practices in comparison with family practitioners, who more often used consultations and pharmaceutical representatives".

- Availability of specialists, colleagues and opinion leaders

Gruppen noted the "prominent finding" in the studies he reviewed that physicians commonly seek information and advice from other physicians. "A number of studies have focused on the characteristics of the physicians that other physicians seek out for advice and information. Often identified as "opinion leaders" ... they were early adopters of new techniques, stayed up-to-date on advances within their fields, and disseminated innovations in medical diagnosis and treatment to their colleagues". In the development of the ISCM the role of key opinion leaders in the diffusion of innovations was noted (Chapter 2, section 2.4.3.3 above).

An important factor in a user's choice of a source that is highlighted by the ISCM is the perceived credibility of that source, including its trustworthiness, quality, accuracy, authority and reliability. The literature on physicians' information behaviour endorses this. In a study of information sources used by cancer clinicians, Tan *et al.* (2006) reported: "The reputation or the credibility of the source is also important. Many expressed caution about information from pharmaceutical company

sponsored or related websites. Clinicians are more likely to trust content from independent sources such as cancer organizations, universities and hospitals."

Rogers (2003) emphasized the importance of homophily in the diffusion of innovations. Thus physicians use other physicians as information sources partly because they are in the same profession (homophilous) and "share common meanings and a mutual subcultural language" (Rogers, 2003, page 19). They may therefore be regarded as trustworthy and credible.

Hughes *et al.* (2010) investigated the use of the Internet by 35 hospital physicians. The physicians used over 50 websites to find information, including some recommended by the NHS, such as PubMed (http://www.ncbi.nlm.nih.gov/pubmed/), which was used by 30%. They also used many general-purpose sites such as Google (79% of physicians) and Wikipedia (71%), and various patient forums or medical-specific wikis. The findings show the importance of the physicians' perception of credibility when choosing which websites to use. The authors comment "Results show that doctors, though aware of the need for information quality and cognitive authority, rarely make evaluative judgments." Instead they favour "known sites where doctors perceive levels of information quality and cognitive authority."

In another study of physicians' information seeking using the Internet, Bennett *et al.* (2004) reported: "Critical to seeking clinical information is the credibility of the source, followed by relevance, unlimited access, speed, and ease of use." In a review of the information needs of public health professionals, Revere *et al.* (2007) noted that "An information source's accessibility, relevance, trustworthiness, currency, quality, and reliability can determine whether an information need is met or is not fulfilled."

Another important factor highlighted by the ISCM in a user's choice of a source is its utility, including access, ease of use, relevance and currency or timeliness. The literature on physicians' information behaviour also endorses this aspect of the model. In his 1996 review of the literature on doctors' clinical information needs, Smith commented: "Textbooks, journals and other existing information tools are not adequate for answering the questions that arise [when treating patients]: textbooks are out of date, and the 'signal to noise' ratio of journals is too low for them to be useful in daily practice" (Smith, 1996). In other words, textbooks and journals –

mentioned in many studies as key information resources used by physicians (Bennett *et al.*, 2005; Davies, 2007; Dawes and Sampson, 2003; de Lusignan, 2003) – rate poorly in terms of utility.

Since Smith's 1996 review electronic resources and the Internet have become much more widely used but recent studies still report issues relating to utility. In 2011 Davies reported the findings of a large study of information needs and barriers involving 353 hospital physicians and 256 general practitioners (Davies, 2011). Significant barriers to accessing information using electronic resources included the following aspects of the sources' utility: lack of easy access, too much irrelevant information, and time taken to search.

Physicians may choose sources because of their ready availability (high utility) even though they regard them as having lower credibility than other sources. Curley *et al.* (1990) studied the use of information resources by hospital and family practice physicians. They found that factors related to the resources' utility ("availability, searchability, understandability, and clinical applicability") were more important than credibility in the physicians' decisions to use them. Physicians often obtain information from pharmaceutical companies' representatives and yet consider such information as less credible than that from sources such as medical journals (McGettigan *et al.*, 2001). The information from company representatives has high utility because it is easy to access: representatives bring it to the physician and it is presented in summary form which is easy to understand, so that the physician does not have to read through and analyse detailed clinical trials reports. Physicians also use Google as a search engine because of its high utility including ease of use, speed and convenience (Sim *et al.*, 2008) despite the fact that it may yield information of inconsistent or poor quality (Falagas *et al.*, 2008; Taubert, 2006).

4.2.7   Seeking information

The information seeking activities of physicians have been reported in many studies and reviews (e.g. Andrews *et al.*, 2005; Bennett *et al.*, 2004; Coumou and Meijman, 2006; Cullen, 2002; Davies, 2007; Dawes and Sampson, 2003; Gorman, 1999; Lacey Bryant, 2000; Masters, 2008; Reddy and Spence, 2008). As outlined in section 4.2.5 above, physicians use a wide range of information sources.

Physicians often do not seek information from external sources when choosing treatments for their patients but instead rely on their own knowledge and experience, a practice described by Black and Tagg (2007) as self-referencing. This becomes more common as they gain experience with particular illnesses, patient types and treatments, and their perception of their expertise or self efficacy grows (Black and Tagg, 2007). If they perceive a gap in their knowledge or lack confidence in their self-efficacy they may seek information from external sources.

The activities involved in seeking information include asking colleagues (Covell *et al.*, 1985; Davies, 2007; Ely *et al.*, 2005), checking printed sources such as textbooks, reference books and journals (Cantrill, 2008; Davies, 2007; Ely *et al.*, 2005) and, increasingly, accessing electronic sources, websites and search engines (Bennett *et al.*, 2004; De Leo *et al.*, 2006; Masters, 2008; Sim *et al.*, 2008) through networked computers, wireless laptops, mobile phones and other devices (Davies, 2011).

Physicians' searching activity is affected by a similar range of factors to those that influence their decisions on whether or not to seek information and which sources to use. Dawes and Sampson (2003) carried out a systematic review of studies of clinicians' information seeking behaviour. They reported that "Convenience of access, habit, reliability, high quality, speed of use, and applicability makes information seeking likely to be successful and to occur. The lack of time to search, the huge amount of material, forgetfulness, the belief that there is likely to be no answer, and the lack of urgency all hinder the process of answering questions." Thus factors identified in the ISCM affect the success of information seeking, including:

- Environmental and personal context (lack of time, lack of urgency, habit, forgetfulness, belief that an answer can not be found)
- Utility (accessibility and speed of use of sources and relevance or applicability of the information from those sources)
- Credibility (high quality of information)

Physicians' success in finding information also depends on their skills with the sources they use. In a questionnaire survey of Internet use involving 3,347 physicians in the USA, Bennett *et al.* (2004) found that "More than half of the respondents were confident (37.3%) or very confident (21.4%) in their Internet search skills in seeking medical information; 10% reported that they lacked

confidence." However, physicians' assessments of their skills are inevitably subjective. Cullen (2002) carried out a study of 294 physicians in New Zealand involving a postal questionnaire followed by interviews with 12. Cullen reported that when searching Medline, a widely used medical database available on the Internet, "it was clear that search skills of respondents were quite varied" but on the whole were "basic" and relied mainly on using keywords. In a subsequent study, the effects of training medical students in searching, retrieving and evaluating clinical information were investigated after they had qualified and were in their first clinical positions (Cullen *et al.*, 2011). The investigators found that "Most participants recalled the training they received but had not retained high-level search skills, and lacked skills in identifying and applying best evidence. There was no apparent link between the type of training given and subsequent skill level." They further commented: "In general the clinicians in this study were more confident in their abilities than their performance would merit".

McKibbon *et al.* (2007) also found that physicians' information seeking skills were inadequate. Forty-three physicians were given multiple-choice clinical questions to answer. Having done that, they were asked to choose two of the questions and to carry out searches for answers using information sources of their own choice. Before searching, an average of only about 39% of their answers were correct. Searching for information produced little improvement in answers, with an average of about 43% being correct after searching. The investigators also assessed the physicians' attitudes towards risk and their comfort with uncertainty. They reported that those who were risk averse or who were more prone to stress when uncertain spent more of their search efforts on analysing results than those who were less risk averse and less stressed by uncertainty. The latter groups relied more on heuristics or general rules of action than did the former. There was also a trend for the latter groups to favour using systems that provided answers or summaries of evidence, such as the Clinical Evidence website (http://clinicalevidence.bmj.com/x/index.html) and the Cochrane Library (http://www.thecochranelibrary.com/) and also Medline/PubMed (http://www.ncbi.nlm.nih.gov/pubmed/).

These findings provide an illustration of the importance of feelings and thoughts in information seeking as depicted in the ISCM. Physicians may seek information feeling/thinking that their search skills are good enough. If they find information they may not question whether they have found everything that is relevant. If they find no relevant information, they may assume that none exists and may not look further or

seek help. In the study by Cullen *et al.* (2011) only four of the 38 participants said that they asked a librarian to help find information. Stress associated with uncertainty or concern about risk (risk of making a wrong clinical decision, for example) may also affect information seeking – the resources used or the analysis of the search.

4.2.8 Communication, process and medium

Communication by an information user is an aspect of information behaviour shown in the ISCM but not always made explicit in other models. It plays an important role in the information behaviour of physicians. They often communicate with their colleagues when seeking information: "Clinicians often find it quicker to rely on ... advice from a colleague when they must make decisions" (McKibbon, 1998).

In a small study of eight hospital doctors and two nurses Coiera and Tombs (1998) found that these health care professionals were involved in communication events using telephone or pagers (either receiving or sending messages) at an average frequency of one event every 18.5 minutes. They were also involved in multiple face-to-face conversations with colleagues and other staff but statistics were not recorded. One-third of the outgoing calls (15 of 45) from medical staff were to other medical staff; the other calls were to book investigations of patients (19 of 45) and to secretarial and administrative staff (11 of 45). Nearly half of calls received by physicians were from other physicians (15 of 33 – figure on page 674), the rest being from nurses (16 of 33) and administrative/secretarial staff (2 of 33). Typically the information requested and communicated concerned patients' details, diagnoses and treatments. The findings demonstrated physicians' high degree of reliance on communication with colleagues, and the authors commented: "While some information was obtained from formal sources like patient notes or laboratory results, in this study textbooks, journals, and other publications were not consulted at all."

The study by Coiera and Tombs also showed that the processes of communication between physicians and between them and other staff or departments were not efficient: "Communication behaviour resulted in an interruptive workplace, which seemed to contribute to inefficiency in work practice" (Coiera and Tombs, 1998). The authors added: "much may be gained by supporting information exchange through communication technology." Despite improvements in information

technology since that study was carried out, more recent studies have reported on the continuing dangers of poor communication among physicians and between them and other staff or departments, including clinical errors and adverse effects of treatment (Coiera, 2006; Coiera, 2008; McKnight *et al.*, 2002; Ong and Coiera, 2011).

Physicians make use of a range of processes, systems and media to communicate and to receive communications. As reported in the study by Coiera and Tombs (1998) face-to-face discussions are common, as are communications by telephone and pagers. Networked computers, laptops, mobile/smart phones and other devices are widely used (Davies, 2011). Social media applications are increasingly used by physicians for communication with each other or for education (Berben *et al.*, 2011; Black *et al.*, 2010; Chu *et al.*, 2010; Mansfield *et al.*, 2011).

Many individuals and organizations outside physicians' immediate working environment communicate with them, including NHS bodies, NICE (http://www.nice.org.uk/), professional bodies such as the Royal College of Physicians (http://www.rcplondon.ac.uk/), and pharmaceutical companies. Communication takes place in a variety of ways using a range of media, including mail, email, telephone, publications, presentations at meetings and conferences, websites and, in the case of the pharmaceutical industry, through advertisements, visits by company representatives and other communications such as those concerned with physicians' participation in clinical trials (Cardarelli *et al.*, 2006; Lexchin, 1993; Shaughnessy and Slawson, 1996; Spiller and Wymer, 2001).

As shown in the ISCM, communication can be a two-way process (Figure 26). An information provider may proactively communicate with an information user, who then communicates back to the provider. For example, a pharmaceutical company may issue an advertisement about one of its products, as a result of which a physician who reads the advertisement may contact the company and ask for further information. Perhaps the most frequent form of two-way communication is a conversation. A common example in medicine is when two or more physicians talk to each other about a clinical problem and ask each other questions (Reddy and Jansen, 2008). In such a case each participant in the conversation may be an information user but each may take turns in acting as an information provider by answering questions and contributing information from his or her experience and knowledge.

4.2.9   Assess and process information

As has already been outlined, physicians particularly use information that they find or that is communicated to them to inform their management of patients. Ebell (1999), himself a physician, says: "We integrate that information with what we already know about our patient, his or her family and community, and information from original research, colleagues, textbooks, and other sources. We then develop a plan for evaluation and management, and implement it ...". This integration of information requires some assessment or evaluation of it. A significant obstacle to physicians' assessment of information is the time that may be needed to do it. Ely *et al*. (2005) noted that lack of time is one of the most common barriers that hinder physicians from answering their questions.

Proponents of evidence-based medicine have described systematic methods by which physicians and others may evaluate information about treatments for their patients. When making an assessment of a clinical trial of a particular treatment, for example, Straus *et al*. (2011) suggest that three questions should be asked, each of which requires answers to a number of subsidiary questions:

- Are the results of this individual study valid?
    – Was the assignment of patients to treatment randomized?
    – Was the randomization concealed?
    – Were the groups similar at the start of the trial?
    – Was follow-up of patients sufficiently long and complete?
    – Were all patients analysed in the groups to which they were randomized?
    – Were patients, clinicians and study personnel kept blind to treatment?
    – Were the groups treated equally, apart from the experimental therapy?
- Are the valid results of this individual trial important?
    – What is the magnitude of the treatment effect?
    – How precise is this estimate of the treatment effect?
- Are the valid, important results of this individual study applicable to our patient?
    – Is our patient so different from those in the study that its results cannot apply?
    – Is the treatment feasible in our setting?
    – What are our patient's potential benefits and harms from the therapy?
    – What are our patient's values and expectations for both the outcome we are trying to prevent and the treatment we are offering?

Similar systematic approaches have been developed for assessing information about treatments' side-effects, diagnosis and screening, prognosis and other types of information (Straus *et al.*, 2011). However, such methods are time-consuming and in clinical practice physicians are unlikely to have time to search for and evaluate information in such a rigorous way: "Decision making depends on both *accessing* and *interpreting* evidence. In primary care, GPs have less than five hours a week for reading, educational courses, and teaching" (Jacobson *et al.*, 1997). To help physicians in the UK in their clinical decisions without having to assess all the information and evidence themselves, NICE (http://www.nice.org.uk/) issues evidence-based treatment guidance, but NICE guidelines do not cover all therapies and do not answer all the questions that physicians may have. There are other sources of evaluated evidence and information about health care interventions and treatments such as the Cochrane Library of systematic reviews (http://www.thecochranelibrary.com/view/0/index.html) but systematic reviews are time-consuming to read and the Cochrane Library does not cover all possible treatments.

In practice physicians often make clinical decisions on the basis of their own knowledge and experience rather than searching for and evaluating all the relevant information (Gorman, 1999). If they need further information or guidance they often seek advice from a colleague (McKibbon, 1998).

When physicians seek or receive information, an important factor in their assessment of it and whether to use it is its credibility and the credibility of the source from which it comes. In a survey involving 2,200 physicians in the USA who were asked about their use of the Internet, 41% rated credibility of the source as the most important criterion when seeking medical information (Casebeer *et al.*, 2002). Tan *et al.* (2006), who interviewed cancer clinicians in Australia to investigate their use of and opinions about online information sources used, reported: "The reputation or the credibility of the source is also important." Similarly, Tracy *et al.* (2003), who studied the attitudes of primary care physicians in Canada to evidence-based medicine, found that "There was a tremendous level of concern on the part of respondents with respect to issues of credibility, bias, and the trustworthiness of evidence ... This anxiety was most readily apparent in physicians' expressions of unease and apprehension regarding the role of the pharmaceutical industry in the funding and conduct of clinical research."

However, physicians' use of information also depends on its utility: they do not necessarily ignore or dismiss information because of views about the source. In the study by Casebeer *et al.* (2002) already mentioned, 35% of physicians surveyed felt that quick 24-hour access to information was the most important criterion when seeking medical information on the Internet, and 24% rated ease of searching as the most important. In the study by McGettigan *et al.* (2001) general practitioners who were asked to name the last drug they had prescribed and the source from which they first obtained information about it referred to pharmaceutical company representatives as the most common sources (used in 42% of cases). Other studies have also noted physicians' use of information about medicines from pharmaceutical companies and their representatives (Connelly *et al.*, 1990; Jones *et al.*, 2001; Thompson, 1997). Thompson (1997) commented: "The most desired characteristics of information resources for primary care physicians are availability, familiarity, and low cost." Information from pharmaceutical companies is readily available to physicians, is free and, for those who regularly see companies' representatives, the source is familiar. Thus physicians may use information from the pharmaceutical industry because of its easy accessibility, an aspect of its utility, despite concerns about the motives of the industry and the credibility of its information (Wazana, 2000).

These findings provide support for the ISCM and the role of the credibility and utility of information in users' assessment of it and their decision on whether to use it.

4.2.10 Actions and decisions

Physicians' decisions and actions often concern management of a patient: diagnosis of the patient's disorder; referral for further tests if necessary; referral to another health care professional such as a consultant physician or surgeon; treatment with medicines or other therapies; or no immediate treatment but continued observation of the patient over time to monitor the progress of the disorder – "waiting on events" or "watchful waiting" (Longmore *et al.*, 2004, page 8). Physicians may take decisions and actions on the basis of:

a) Information that they have actively sought (Gorman and Helfand, 1995) from information resources such as books, journals and websites (Bennett *et al.*, 2005; Davies, 2007; Dawes and Sampson, 2003; de Lusignan, 2003; Masters, 2008), or from colleagues (McKibbon, 1998; Reddy and Spence,

2008) including through social media (Black *et al.*, 2010; Mansfield *et al.*, 2011), or from other sources such as pharmaceutical companies (Jones *et al.*, 2001).

b) Information proactively communicated to them such as clinical guidelines from NICE (http://guidance.nice.org.uk/CG/Published), formularies developed by hospitals or health care authorities specifying which medicines and other therapies are the preferred choices for use in a hospital or area (Schiff *et al.*, 2012), and information communicated by pharmaceutical companies through advertising or the activities of companies' representatives (Collier and Iheanacho, 2002; McGettigan *et al.*, 2001).

c) Their own knowledge and experience, without seeking additional information (Gorman, 1999).

The ISCM captures these options by showing that information users such as physicians may: (a) pursue their information needs, choose information sources, seek information from them, assess it and, if it meets their needs, use it to make decisions and take action; (b) receive information communicated by providers, assess it and either use it to make decisions and take action or ignore it; (c) make decisions and take action without pursuing information needs or without the need for additional information (this scenario is represented by arrow ① in Figure 25.

4.2.11 Summary of findings

The findings from the literature review provide substantial support for the Information Seeking and Communication Model. A fundamental proposition of the model is that an information user exists and acts within a context which affects the user's needs, wants, goals, perceptions and information behaviour. From the literature review it is clear that the information behaviour of physicians and their information needs and wants are affected by both their environmental and their personal contexts. The former includes the health care environment in which they work, their job roles, and hospital or general practice environments. Their personal context includes their professional training, experience, expertise and knowledge gaps and their information literacy.

The model suggests that contextual factors affect information users' decisions on whether or not to seek information and their choice of information sources. According to the literature, physicians may pursue only about a third to a half of the questions that arise when caring for patients (Covell *et al.*, 1985; Ely *et al.*, 2005; Gorman and Helfand, 1995). The model refers to motivating and inhibiting factors that affect the information user's decision on whether or not to seek information. From the literature various inhibiting factors that discourage physicians from seeking information can be identified, such as workload and lack of time, doubt about the existence of relevant information, lack of urgency, uncertainty about where to look for information and lack of search skills (Davies, 2007; Ely *et al.*, 2005). The literature also reveals that there are particular motivating factors that encourage physicians to seek information, notably the urgency of the patient's problem and a belief that an answer to a question exists (Gorman and Helfand, 1995).

Physicians use variety of information sources. Their choice of sources is affected by their personal context, including age and experience, and by their environmental context, including role and practice characteristics (Gruppen, 1990). As the model suggests, physicians' perceptions have an important influence on their information behaviour. These include self-perception such as perception of their own knowledge and knowledge gaps and self-confidence or self-efficacy in their use of – or failure to use – information resources (Fourie, 2009). Particularly important in the choice of an information source and the use of information is a physician's perception of the credibility of the information or source: its quality, authority, trustworthiness and reliability (Revere *et al.*, 2007). But as the model indicates, the utility of the information or source is important too – notably its accessibility, ease of use and relevance – and the literature shows that physicians may use information because it is easy to access rather than having a perceived high level of credibility (Curley *et al.* 1990).

The model depicts information seeking as involving activities by the information user and feelings and thoughts that he or she may experience. Physicians' activities in seeking information include asking colleagues, checking printed sources such as textbooks, reference books and journals, and using electronic sources including websites and social media (Bennett *et al.*, 2004; Berben *et al.*, 2011; Davies, 2007; Ely *et al.*, 2005; Mansfield *et al.*, 2011). Some information about physicians' feelings and thoughts associated with information seeking has been reported in the literature. Some experience stress when uncertain and spend more of their search

efforts on analysing results, while others are less stressed by uncertainty and rely more on heuristics than detailed analysis (McKibbon *et al.*, 2007). They may have feelings of confidence in their searching abilities and may not question what they find or whether they have found everything that is relevant. (Bennett *et al.*, 2004; Cullen *et al.*, 2011).

The model portrays the user assessing information and deciding whether to use, ignore or dismiss it and emphasizes the role of the user's perceptions of the credibility and utility of the information/source when doing this. The literature confirms the importance to physicians of the credibility of sources (Tan *et al.*, 2006; Tracy *et al.*, 2003). It also endorses the importance of utility (Casebeer *et al.*, 2002), such as the easy accessibility of information from the pharmaceutical industry (Jones *et al.*, 2001; McGettigan *et al.*, 2001).

The model indicates that information found by a user or communicated by a provider to a user can influence the user's decisions and actions. It also shows that a user may take decisions or actions without seeking additional information or after dismissing or ignoring information from external sources. In these respects the model again reflects physicians' information behaviour: they may decide or act on the basis of information that they have sought (Gorman and Helfand, 1995) or received (McGettigan *et al.*, 2001), or simply on the basis of their existing knowledge and experience (Gorman, 1999).

Thus the literature on physicians' information behaviour provides evidence of the validity and applicability of much of the Information Seeking and Communication Model. However, although the literature review has the major strength of covering an extensive range of research literature on physicians' information behaviour, it may be subject to the criticism that the findings were analysed in relation to the concepts in the ISCM. What is needed in addition is an analysis that attempts to identify any features of information behaviour that are not adequately represented in the model. For this reason a more detailed analysis of the findings from individual studies of physicians' information behaviour was carried out, the results of which are presented in the following sections of this chapter.

4.3 The information needs and behaviour of physicians: content analysis of individual studies

To examine further the applicability and validity of the Information Seeking and Communication Model a number of studies of physicians' information behaviour have been analysed in more detail using deductive content analysis. The technique is described below in section 4.3.1 and the findings are presented in the subsequent sections of this chapter.

Five studies of physicians' information behaviour were analysed:

- Reddy and Jansen (2008) studied collaborative information behaviour in hospital health care teams in the USA using observation and questioning. Many studies and models of information behaviour focus on an individual information user's perspective. It was therefore of interest to discover what additional insights could be obtained from this study of collaboration in information behaviour and how well the ISCM represents such behaviour.

- Prosser *et al.* (2003) interviewed general practitioners in the UK in order to explore the influences and information sources affecting their prescribing decisions.

- Lacey Bryant (2004), using a case-study approach, interviewed general practitioners in the UK to investigate their individual information needs and information seeking behaviour.

- Green and Ruff (2005) used focus group discussions to investigate the problems encountered by junior hospital doctors in the USA when seeking to answer their clinical questions.

- Hughes *et al.* (2010) studied the online searching activities of hospital- and clinic-based physicians in the UK and their judgements of information quality from diaries recording their clinical information searches and by interviewing them.

These studies were selected because:
   a) all involved direct interviews with or observation of physicians
   b) each report is detailed and includes quotations from the physicians or vignettes describing activities observed during the study
   c) together they cover both primary and secondary care physicians (general practitioners and hospital doctors)

d) together they cover a number of different aspects of information behaviour:

  – information needs

  – individual information seeking activities

  – collaborative information seeking activities

  – the use of different types of information sources, including printed sources, people, databases and websites

  – problems encountered in information seeking

  – factors affecting the evaluation and use of information

e) all were published within the ten years before this thesis was written

The aims of analysing these studies in more detail are to add to the findings from the literature review presented in the previous section of this chapter by determining:

  i. whether the concepts identified in the ISCM are all relevant to the information behaviour reported in these five studies

  ii. whether these studies describe any aspects of information behaviour not adequately covered by the concepts identified in the ISCM

  iii. how well the ISCM's representation of information behaviour and the factors affecting it accounts for the findings reported in these studies

4.3.1 Method

Content analysis is a well-established technique for analysing texts and other communications for their content using quantitative or qualitative methods (Krippendorff, 2004). Quantitative content analysis has been defined as "the systematic assignment of communication content to categories according to rules, and the analysis of relationships involving those categories using statistical methods" (Riffe *et al*, 2005, page 3). It has been used for over a century to analyse the content of newspapers and, more recently, other media (Krippendorff, 2004). Quantitative analysis can be used to count words and their frequency of occurrence but it does not provide insights into the deeper meaning represented in the text. Qualitative content analysis was therefore used in this research.

Qualitative content analysis has been increasingly used in the humanities and social sciences, using close reading of text for detailed analysis of its meaning: "Qualitative content analysis goes beyond merely counting words to examining language intensely for the purpose of classifying large amounts of text into an efficient number of categories that represent similar meanings" (Hsieh and Shannon, 2005). It has

been defined as "a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" (Hsieh and Shannon, 2005).

Coding may be applied to a word, a phrase, a sentence or sometimes a paragraph. Graneheim and Lundman (2004) in describing the techniques of qualitative content analysis refer to such a portion of text as a meaning unit: "words, sentences or paragraphs containing aspects related to each other through their content and context."

Content analysis may be used inductively, categorizing elements of the text into categories generated from the text itself (Forman and Damschroder, 2007). Alternatively it may be used deductively (deductive or directed content analysis), employing terms derived from a theory or model (Elo and Kyngäs, 2007; Hsieh and Shannon, 2005; Mayring, 2000). In this chapter deductive content analysis is used to analyse how the ISCM relates to the information behaviour of physicians. In the next chapter it is used to analyse the information behaviour of the pharmaceutical industry and NICE.

This is a novel and original approach, it being the first time that deductive content analysis has been used to test the validity of a new model of information behaviour in this way.

4.3.1.1 Coding terms

A code book was produced representing the features of and factors affecting information behaviour shown in the ISCM and discussed in Chapter 3. The full code book is shown in the Appendix and the main terms are listed in Table 2.

Coding term	Used for
Information	Information; data; content of an information product; also used for information provided as guidance, advice or advocating a course of action.
Utility	Perceived usefulness, relevance, importance, timeliness, accessibility or ease of use of information or of a source.
Credibility	Perceived trustworthiness, reliability, accuracy, objectivity, authority, completeness and lack of bias of information or of a source; homophily of a source.
User	May be an individual, group or organization that: – uses information e.g. to take a decision or action – seeks information – has information needs – receives communications.
User's context	The user's environmental and personal context including: living or working environment, resources and technology available, culture, job role, knowledge, expertise and psychological factors.
User's needs, wants, goals	Personal or job-related information needs, desires or aims that may lead to information seeking.
User's perceptions	Perceptions of self and self-efficacy; perception of a knowledge gap; perceptions of others including sources and information providers.
User's motivating factors	Factors motivating a user to seek information.
User's inhibiting factors	Factors inhibiting a user from seeking information.
Sources	General term covering information products, communication media or the providers of information (definitions below). These more specific terms are preferred when coding text.
Provider	Individuals, groups and organizations that produce, supply or communicate information, or facilitate or control access to it.
Provider's context	The provider's environmental and personal context including, where relevant: living or working environment, resources and technology, culture, job role, knowledge, expertise and psychological factors.
Provider's needs, wants, goals	Personal, job-related or organizational information needs, desires or aims that may lead to production and dissemination of information.

Provider's perceptions	Perceptions of an individual provider or an organization of itself; perceptions of others including users.
Provider's motivating factors	Factors motivating provider to communicate information.
Provider's inhibiting factors	Factors inhibiting a provider from communicating information
Information products	Literature, databases, websites, presentations, TV and radio programmes and other outputs from information providers.
Communication	The process of communicating, disseminating or sharing information by an information provider or by a user.
Communication medium	The medium or channel through which information is communicated, e.g. the Internet, traditional publishing, mass media.
Choose source	A user's decision about which information source(s) to use when searching for information.
Seek/search for information	Wilson's concepts of active, ongoing and passive search. The activities involved in seeking information – e.g. using a search engine to search the Internet, using a database such as PubMed, or asking a question of a colleague or other source.
Feelings and thoughts	Feelings and thoughts when seeking information such as those represented in Kuhlthau's model
Find information	Finding information as a result of information seeking
Assess/process information	Analysing, evaluating, interpreting and organizing information found by searching or received through communication. This refers to a user of information but may also apply to a provider, in which case the provider is also a user using information in order, for example, to produce an information product.
Information use	Using information to:
Act/decide	Take action or make a decision on the basis of the information.
Produce information products	Producing information in printed, electronic or other form (use the term "information products" as above)
Communicate	Disseminating or sharing information (use the term "communication" as above)
Information non-use	Ignoring information or dismissing information received or found

Table 2: Main coding terms used in the content analysis

4.3.1.2 Coding procedure

The coding terms were used to analyse reports from the literature on physicians' information behaviour. The sections of each report describing the findings were read in detail and each portion of text referring to features of information behaviour or factors affecting it was coded with relevant terms from the codebook wherever possible. If any text did not seem to be adequately represented by the existing codes a new term was added. At the end of the analysis of each report, any new terms and the concepts they represented were reviewed to determine how far the model covered them and whether it needed to be modified.

4.3.2 The information needs and behaviour of physicians: content analysis of research findings in the literature

As described in section 4.3 above, five studies were selected (Reddy and Jansen, 2008; Prosser *et al.*, 2003; Lacey Bryant, 2004; Green and Ruff, 2005; and Hughes *et al.*, 2010). The analyses of the findings of these studies are described in the following sections. The analysis of the study by Reddy and Jansen (2008) is discussed first at greater length in order to give a detailed description of the content analysis method.

4.3.2.1 Reddy and Jansen (2008)

Study details

Reddy and Jansen (2008) studied collaborative information behaviour in two hospital-based health care teams in the USA: the surgical intensive care unit (SICU) in a large urban teaching hospital and the emergency department (ED) in a small rural non-teaching hospital. Their findings were obtained using an ethnographic approach, with observation and questioning of staff about how they obtained information, and covered three main aspects of information behaviour:

- Communication
- Information needs
- Role of information retrieval technologies

The field notes and interviews were transcribed and were then analysed to identify categories and the relationships between them.

Content analysis and applicability of the ISCM

Most of the coding terms relating to the information user were relevant to this study, as can be seen from the following extracts.

- **Extract RJ1**

  "Because the work was often rapid-paced in the SICU and ED, communication was essential to finding needed information. In both units, team members were physically co-located and, therefore, much of the interaction was face-to-face." (Page 263)

Here the authors set the scene, describing the environmental context of the information users, noting that they have information needs and that communication with colleagues was an important way for users to find information. The extract includes several concepts from the ISCM:

- Information users ("team members")
- Information users' environmental context (a "rapid-paced" working environment where "team members were physically co-located")
- Motivating factor for particular information behaviour (the rapid pace, which made communication with colleagues "essential to finding needed information")
- Communication (two-way)
- Finding information
- Users' needs ("needed information")
- Communication medium ("much of the interaction was face-to-face")

- **Extract RJ2**

  "John, a resident, is checking on some medication that the patient is receiving. He asks the nurse if she knows why the patient is receiving a medication that John is not familiar with. The nurse shrugs her shoulder and tells John to talk to Susan, the pharmacist. Susan who standing close by walks over and says, 'I know what that medication does but I am not sure why this patient is getting it'." (Page 263)

This vignette illustrates the sort of interactive communication between health care professionals that the authors observed. A number of concepts from the ISCM are relevant here, including:

- Information seeking through communication ("He asks the nurse ...")
- Information user's personal context – knowledge or lack of knowledge ("a medication that John is not familiar with", "I know what that medication does")
- Communication ("The nurse ... tells John to talk to Susan", "Susan ... says...")

- **Extract RJ3**

    "Both John and Susan then start looking for more information about why the patient is getting this medication. Susan is providing John information about the medication and the possible side-effects. During this process, they are continuously exchanging information until they piece together the story. They realize that the patient is getting the medication by mistake. They then stop the medication." (Page 263)

Key aspects of information behaviour in this extract are:

- Information seeking – collaboratively ("John and Susan then start looking for more information")
- Information provider ("Susan is providing John information")
- Communication – two-way ("they are continuously exchanging information")
- Processing information – collaboratively ("they piece together the story")
- Act – collaboratively ("They then stop the medication")

The particular focus of Reddy and Jansen in this study is collaborative information behaviour and this extract provides examples of such behaviour. When analysing the text a new coding term, "collaborative information behaviour", was initially used. Once coding was complete the sections of text coded with this term were reviewed to determine if they represented concepts that were not included in the ISCM. The specific collaborative information behaviours observed in the study were collaborative information seeking, collaborative information processing, and collaboration in decision making and taking action, all of which are illustrated in this extract. A related activity was information sharing, which other authors have also described (Bao and Bouthillier, 2007; Pilerot, 2012; Talja, 2002); the two-way communication in this extract is an example and it shows that a user of information

(Susan) can become a provider of information to another user (John). The ISCM's representation of collaborative information behaviour and information is discussed further below (section 4.4).

− **Extract RJ4**

"The team members are talking about a patient during morning rounds. They are concerned about the spike in the patient's temperature and are not sure what is causing it. Because there are many different aspects of the problem they want to look at, the team splits up the tasks. Susan, the pharmacist, prints out a medication list to check what the patient is on. John, a resident, checks the culture book to see if the patient has any infections that might be causing this. Gina, a fellow, is checking the patient record system for information and Vasanth, another fellow, is checking the patient to try to get more information." (Page 264)

Concepts from the ISCM in this extract include:
- Information users ("The team members")
- Information users' personal environment – lack of knowledge ("They ... are not sure what is causing it")
- Information users' needs/wants ("there are many different aspects of the problem they want to look at")
- Users' motivating factor for information seeking ("They are concerned about the spike in the patient's temperature and are not sure what is causing it")
- Information seeking – collaboratively ("the team splits up the tasks", "check what the patient is on", "checks ... to see if the patient has any infections", "checking the patient record system for information", "checking the patient to try to get more information")
- Information products or sources ("medication list", "culture book", "patient record system", "the patient")
- Information

These four extracts and other parts of the text demonstrate the applicability of the following concepts from the ISCM:
- Information
- Information user
- User's context

- User's needs, wants, goals
- User's motivating factors
- Information seeking
- Find information
- Assess/process information
- Act/decide
- Information sources
- Information providers
- Information products
- Communication
- Communication medium

Other coding terms from the ISCM that were used in the content analysis were:

- Choose source ("He turned to the pharmacist because she had the specific domain knowledge" page 263)
- Provider's personal context – knowledge and expertise ("... she had the specific domain knowledge about the medication and could provide some insight into why the patient was taking this particular medication" page 263)

Terms that were not used in the analysis were:

- Utility
- Credibility
- User's perceptions
- User's inhibiting factors
- Provider's perceptions
- Provider's needs, wants, goals
- Provider's motivating factors
- Provider's inhibiting factors
- Feelings and thoughts
- Information needs not pursued
- Information ignored or dismissed
- Communication not received

The findings of the study did not overtly refer to the credibility or utility of information or sources or to users' perceptions of sources and so these concepts were not coded in the analysis. However, the information behaviour described does implicitly

endorse the importance of these concepts. It is reasonable to assume that the health care professionals would not have collaborated in information seeking and sharing if they had not perceived each other to be credible sources. Because they worked together and each had specific knowledge and expertise, they were accessible and useful and thus had high utility.

The focus of the study was on collaborative information behaviour within each hospital team. External providers, their needs and goals, motivating and inhibiting factors were not studied and so these concepts did not occur in the analysis.

The study reported on collaboration leading to successful searching for and use of information. There was no discussion of factors inhibiting information seeking, information needs not being pursued or information being ignored and so these concepts were not identified in the analysis.

To prove the validity of the ISCM it is not necessary that every facet of information behaviour represented in the model should be demonstrated in every study. It is, however, important that any new coding terms arising during content analysis of a study's findings should be examined to determine whether they represent concepts that are not adequately covered by the model. During the initial content analysis a new coding term, "collaborative information behaviour", was used. As mentioned in the discussion of extract RJ3 above, the specific collaborative information behaviours observed in the study were collaborative information seeking, collaborative information processing, and collaboration in decision making and taking action, and a related activity was information sharing. The ISCM encompasses information sharing. This is perhaps best shown in Figure 26, the component of the model representing the two-way flow of information. In this the user and provider roles are interchangeable: a user can become a provider and vice versa. To make it clearer that information behaviour may involve collaboration between users, the model can be modified slightly to show more than one information user (see section 4.4 and Figure 28 below).

The analysis of the findings from this study provides support for many aspects of the ISCM's representation of information behaviour. Information users have information needs that derive from their working context. In this report John, the physician, is responsible for the care of a patient and needs to find out about the medication the patient is receiving and also to find a cause of the patient's spike in temperature. As

suggested by the ISCM, information needs may derive not only from the environmental context but also from the user's personal context. In this case John's need for further information about the patient's medication is driven by his personal lack of knowledge about the particular medicine concerned. The ISCM also refers to the role of motivating factors in encouraging particular information behaviour. In this report the rapid-paced environment in the hospital, with a need to take actions and decisions quickly, encourages communication between colleagues in order to find and share information. Such sharing of information is shown as two-way communication in the ISCM (Figure 26), with information users acting as information providers. Once information has been obtained, the ISCM shows that the user may assess and process it before acting on it. In extract RJ3 the health care professionals process information, using it to "piece together the story" and then act on it – "They then stop the medication". The important influence of credibility and utility on information behaviour, as depicted in the ISCM, is implicit in the findings. If health care professionals rely on each other as information sources they must perceive each other to be credible. They also have high utility in that they work together and it is easy to ask each other questions.

The findings have little to say about the model's depiction of the information provider except in so far as an information user may also be a provider, but evidence about information providers, their activities and the factors affecting them has been obtained from the empirical research involving pharmaceutical companies and NICE described in Chapter 5.

4.3.2.2 Prosser *et al.* (2003)

Study details

Prosser *et al.* (2003) studied 107 general practitioners in the UK. The main aim of the study was to investigate the factors influencing physicians to prescribe newly launched drugs. The investigators carried out semi-structured interviews employing the critical incident technique to encourage the GPs to recall prescribing events, the reasons for prescribing a new drug and the sources of information that they used. The transcripts of the interviews were analysed using a grounded theory approach to identify categories of reasons for prescribing.

Content analysis and applicability of the ISCM

Common concepts in the findings concerned:

- Information
- Information users (physicians) and their context (working environment and expertise)
- Their actions/decisions in prescribing new drugs
- Sources and providers of information
- Credibility of information and sources
- Communication

All of these and other concepts were coded by terms derived from the ISCM and the majority of the coding terms listed in Table 2 were applicable. Although the study investigated the role of information providers and sources as influences on GPs, it did not provide details of the providers' contexts, goals, perceptions or motivating or inhibiting factors and so these coding terms were not used. No new concepts were identified from the analysis to suggest that any revision of the model is needed.

The ISCM suggests that information users actively seek information to meet their needs when taking decisions or actions, or alternatively they may receive information that is communicated to them. The findings of this study indicate that the latter form of information behaviour may be particularly relevant to general practitioners when deciding whether to prescribe new drugs:

- **Extract P1**

  "... exposure to new drug information tended to be reactive, implicit and ad hoc. GPs undertook an active search for information on new drugs in only 33 (5%) incidents. Furthermore, in 227 cases (37%), the initial informant was both the only information source and the major prescribing influence. The pharmaceutical industry was the prime mover here in 208 incidents, especially the representative (179 incidents)." (Page 64)

The ISCM highlights the influence of contextual factors (environmental or personal) on information behaviour. The reason why general practitioners may not seek information as in the above extract may be because of such factors and evidence for this is provided in extract P2.

Reasons given for not reading scientific journal papers:

"I mean, we're faced with information overload. It really is a problem"....

"I'm not a researcher, so I wouldn't know whether a piece of research was good, bad or indifferent. There's no easy way round it." (Page 66)

Because of "information overload" a GP may not have time in a busy working environment to find information about the latest research from scientific journals. In the ISCM's terms, information overload or lack of time are inhibiting factors. Alternatively the GP may consider that his or her personal knowledge and skills are inadequate to assess such information.

Extract P1 illustrates the significant role that information providers can play in influencing decision making. According to the ISCM the recipient of information from a provider would assess the information, use it or ignore it and would be influenced by factors such as the utility and credibility of the source and information. The study findings provide support for this as shown in the following extract.

– **Extract P3**

Ninety-two of the GPs saw representatives, and most (70%) regarded representatives as an expedient means of acquiring and processing drug information and keeping up to date with new products. Although GPs questioned the objectivity of the industry, they generally considered its information to be factually accurate, if selective.... Despite GPs' concern regarding commercial information, a long-standing and trusted relationship with a company or representative led to accepting drug information, and reduced the perceived risk. (Page 64)

The utility of company representatives as "expedient" sources of information influences general practitioners to use the information that they provide, which in turn influences the GPs' prescribing decisions. Although the GPs believe that such information may be selective, they perceive it to be sufficiently credible – "factually accurate" – to use it, apparently without further assessment.

According to the ISCM, perceptions affect information behaviour and perceptions are affected by contextual factors, notably personal and psychological factors. This extract confirms this and illustrates the role played by interpersonal relationships. By establishing a personal relationship with an information user, a provider may influence the former's perceptions of the provider. In this case a relationship built up over time between a general practitioner and a company representative can increase the GP's trust and the perceived credibility of the information provided.

Another example of the influence of information providers on decision making is shown in extract P4.

−   **Extract P4**

 "The letters from the hospital don't often explain very much, they just say, 'I've decided to give Mrs So-and-so …' or rather they're telling us to prescribe X for Mrs So-and-so. They don't put in a logical argument as to why they want you to prescribe that drug." (Page 66)

In this example the information provided by the hospital is not meant simply to inform the GP but also to direct him/her in future prescribing decisions.

The ISCM shows that information providers may also communicate with each other (arrow ⑤ in Figure 25). For example an opinion leader may receive information from a provider (such as a company marketing a product) and then act as an information provider to others. Extract P5 gives a possible illustration of this aspect of the model.

−   **Extract P5**

"If the consultants who I perceive to be the better consultants are actively prescribing something then that would influence me. Occasionally, there may be a negative influence—someone who you don't feel is that on the ball or someone who you know is maybe influenced by pharmaceutical companies." (Page 66)

This extract again demonstrates the importance of perceptions: the GP is influenced by "consultants who I perceive to be the better consultants". However, the GP perceives that some other consultants have less credibility – perhaps if their knowledge or expertise is inadequate (not "on the ball") or if pharmaceutical

companies have influenced them. The latter possibility implies communication between companies and these consultants, who then provide information obtained from the companies. This information may then be perceived by the GP to be less credible as it may favour the companies' medical products.

A further influence on general practitioners' prescribing decisions may come from their patients:

− **Extract P6**

"The patient insisted that I prescribe it. Strictly I should not prescribe just according to patient demand. I wasn't convinced it was a useful drug to prescribe … I feel annoyed because patients hear about so-called revolutionary medicine and the lay press get hold of it. It's the Daily Mail syndrome. You have a group of articulate, half informed, half knowledgeable patients who can be very pushy. They put their hands in their pockets and pull out a newspaper clipping about a drug they feel they should have." (Page 67)

This example shows the importance of the physician's context or working environment. A general practitioner may be confronted by a patient who has obtained information about a new drug from the media and who then demands to be treated with it. Thus the information that influences the physician's prescribing decision may come from the patient. Despite reservations about the credibility of such information (patients are only "half informed"), the GP may prescribe the drug.

The findings of this study provide support for a number of aspects of information behaviour as represented in the ISCM, including:

- The influence of communications from different information providers
- The importance of the information user's contextual factors and perceptions
- The effects of inhibiting factors on information seeking
- The significance of the credibility and utility of information and sources
- Communication between information providers

The analysis revealed no new features of information behaviour that would require a revision of the model.

4.3.2.3 Lacey Bryant (2004)

Study details

Lacey Bryant (2004) carried out in-depth interviews or group discussions with 58 general practitioners in the area of Aylesbury in the UK. The aims of the study were to investigate the physicians' information needs, the factors motivating them to seek information and their information seeking behaviour. A medical library was available locally which could be used by GPs, and some doctors' practices also had a librarian. The study also investigated the use of these services.

Content analysis and applicability of the ISCM

When the findings section of the report was subjected to content analysis it was found that the text could be adequately coded by the terms derived from the ISCM. The majority of the coding terms listed in Table 2 were applicable. Since the study investigated physicians' information needs, their information seeking behaviour and factors affecting it, it was not surprising to find that frequently occurring concepts in the text concerned:

- Information
- The information user, including the user's context (working environment and role, career stage, expertise and knowledge), perceptions and information needs
- Information seeking
- Motivating and inhibiting factors
- Information sources
- Utility or credibility of information

Concepts relating to information providers were not found except in reference to librarians (see extracts LB3 and LB4 below). No new concepts were identified from the analysis to suggest that any revision of the model is needed.

The findings endorsed a number of aspects of the ISCM's representation of information behaviour. The following extracts provide illustrations.

Extract LB1 demonstrates, as suggested by the ISCM, that the user's context affects

his/her needs and wants and the motivating or inhibiting factors that influence the decision to seek information.

- **Extract LB1**

  "Articulated by every single informant, the clinical care of individual patients was the primary reason for seeking information. Information need was perceived as problem-orientated. One doctor coined the phrase 'clinical conundrums' to describe questions arising from the diagnosis and therapeutic management of patients.

  'Immediately wanting to find an answer to a specific question raised in a consultation with a patient, so it is very much patient-led in terms of going out and searching out for information.'"

  (Pages 87-88)

Here the information user's work (environmental) context is that of a physician providing care to patients. In this context information needs arise, including questions about diagnosis and treatment, which lead to a decision to seek information. One of the motivating factors affecting the decision is urgency: "Immediately wanting to find an answer to a specific question".

The ISCM also shows that the user's personal context, which includes experience, knowledge and expertise, affects information needs and influences information seeking. Lacey Bryant's findings provide evidence of this, as illustrated by Extract LB2:

- **Extract LB2**

  "By the time you've finished your GP Training Scheme you should be right up to date on therapeutics. Where I never felt completely confident, to begin with, was on the subject of diagnosis … After 10 years of experience ... your confidence from the point of view of diagnosis and prognosis is very much better but your knowledge of therapeutics is becoming out of date." (Page 88)

Thus the physician's expertise increases over time, reducing the need to seek information in certain areas such as diagnosis and prognosis, but knowledge of other areas such as therapeutics may become outdated, leading to a need for more

up-to-date information. Such knowledge gaps may motivate the physician to seek information, either because of a specific need or because of general interest. As Lacey Bryant reports: "specific gaps in knowledge on 'new' diagnoses and therapies motivate GPs to pursue information ... Information seeking is driven by 'personal interest and inclination to a large extent.'" (Page 88).

The study findings provide evidence for the ISCM's representation of the utility of a source as an important factor affecting its use and of the role of feelings and thoughts in information seeking:

- **Extract LB3**

  "... having to go away and visit a library remotely makes it less likely to happen, and it's very valuable to be able to pop upstairs to look at it and get back to the patient ... Using this one here [the library in the GP's practice] is fine. It's convenient, it's small. That's half the problem with the one at Stoke. It's feeling a little bit lost there … I think 'Oh God, everyone's wondering who I am' … but having said that I mean it's a very user-friendly place." (Page 90)

In this case the utility of the library in the GP's own practice – its convenient location and small size – is a motivating factor for its use. The lower utility of the library in the postgraduate centre at Stoke Mandeville Hospital, partly because of its more distant location, is an inhibiting factor. Feelings and thoughts during information seeking also have an effect: because of the library's large size, the GP feels "lost" when using it and thinks that other people there wonder who (s)he is.

The preferred sources used by physicians in this study (page 89) were:
- A personal collection
- Electronic resources
- Colleagues and specialists
- A library

Utility or convenience again affected the choice of source. Those physicians who had a library in their own practice were more likely to use it rather than contacting colleagues or specialists.

The findings also provide evidence of the role of an information provider and the provider's context:

- **Extract LB4**

"'I'm not so at ease with librarians' systems, library systems, that I can go in without needing help. I need help because my time is so limited … I do want a service, I'm afraid' ... Library use is influenced by interpersonal relationships, as well as by the quality of the service. '… they're brilliant at getting things for me. So it's about personal relationships.'" (Page 91)

The physician lacks expertise with library systems, which are the environment of the librarian or information provider, and needs the librarian's services. The physician's use of the librarian's services is affected by their utility ("they're brilliant at getting things for me"). This extract also illustrates the two-way flow of information as represented in the ISCM (Figure 26). The physician communicates with the provider to seek information, which the provider then supplies or communicates to the physician. The ISCM suggests that such communications are likely to be affected by contextual factors for both the user and the provider. The extract shows that this is indeed the case: an important contextual factor influencing the physician to seek information through the librarian is limited time. As in the study of Prosser *et al*. (2003) in extract P3 above, interpersonal relationships are identified here as being a factor in information behaviour, and they can be seen as part of the personal or psychological context of both the physician and the librarian.

The findings of Lacey Bryant's study substantiate several aspects of information behaviour as depicted in the ISCM, including:

- The influence of the information user's environmental context (work) and personal context (experience, knowledge and expertise) in generating information needs and on information seeking
- The influence of utility on the user's choice of information and sources
- Feelings and thoughts during information seeking
- Communication and the two-way flow of information between users and providers.

4.3.2.4 Green and Ruff (2005)

Study details

Green and Ruff (2005) carried out focus group discussions with 34 resident physicians (recently qualified physicians who were undergoing training in hospitals)

in the USA. The researchers then performed a thematic analysis of the transcripts from the discussions. The aim of the study was to elicit the barriers encountered by the physicians when trying to answer clinical questions and thus to understand better the obstacles to evidence-based medicine.

Content analysis and applicability of the ISCM

When the findings section of the report was subjected to content analysis the term "barrier" appeared frequently in the text, as would be expected in view of the study's aim, and it was used for different concepts. These different meanings were considered in order to find out whether they could be coded by the terms derived from the ISCM or whether they represented concepts not covered by the model. The eight types of barriers described by the authors (Green and Ruff, 2005, page 177, List 1) were:

Technical or pragmatic barriers
- Access to electronic information resources
- Skills in searching information resources
- Clinical question tracking
- Time

Emotional or cultural barriers
- Clinical question priority
- Personal initiative
- Team dynamics
- Institutional culture

The first of these, access to electronic resources, can be seen in the ISCM as an aspect of the user's environmental context. Lack of access to computers can be an inhibitory factor preventing information seeking:

− **Extract GR1**

"... computer terminals were often not located at the point of care. They [resident physicians] often found themselves wasting precious time in search of computers at some distance from their patients.

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It's often very useful to have one key clinical question and to answer it right on the spot because you need to act fairly soon and you have like three other patients to see and you may not get back to that clinical question in a timely enough manner if you don't have the resources right there to be able to pursue that question." (Page 178)

The second barrier, skills in searching information resources, is part of the personal context but the discussion by Green and Ruff about this potential barrier also refers to other factors relevant to the ISCM, as illustrated in the following extract:

− **Extract GR2**

"... residents had difficulty knowing when to stop searching, because they remained uncertain of the validity, timeliness, or exhaustiveness of the information they retrieved.

It was regarding an algorithm for brain mets' [metastases] of unknown primary. Maybe because I don't have the skill, I didn't know when enough was enough. OK, I had four articles ... and I found myself saying, "I need more. I need the latest data." If the article was from '96 I thought it was not up to date enough.... I think we need to know when we have a clinical question, when do we have an answer to it?" (Page 178)

In this example the level of skill in assessing information affects information seeking: if the physician is uncertain about the validity of the information found and whether it is up to date and complete, he or she will be uncertain whether or not to continue searching. Assessing the information and its validity depends partly on the user's perception of its trustworthiness and truthfulness (credibility in the ISCM) and its relevance (utility). Assessing how up to date and complete it is will also affect the user's judgement of its utility: if it is not up to date or if it is not deemed exhaustive enough its utility will be judged to be less than optimal.

The third barrier, clinical question tracking, is described in the next extract:

− **Extract GR3**

"If unable to respond to a question as a clinical scenario unfolded, residents often deferred the question to a later time... Residents forgot these questions,

despite their good intentions, and lamented the lack of an adequate system to track them.

> *I've had about five different systems in the last three years and there are remnants of all five around the house.... If they were all in one place, it's easier. So I had a little notebook I was going to use but, over time, your shoulders get so sore. You start dropping things out of your white coat and you can't stand to have something else weighing you down. So then it becomes scraps of paper."* (Page 178)

Thus if the physician's knowledge is insufficient to answer a clinical question he or she is likely to defer information seeking until later but may then forget to pursue the information need. In the ISCM's terms the poor utility of the information source or "clinical question tracking" system used in the physician's working environment, which may be only "scraps of paper", inhibits information seeking.

Time, or lack of it, is the fourth barrier and this can be seen as part of the user's environmental context in the ISCM.

The fifth factor, clinical question priority, relates to the urgency of the information need, its relevance to patient care and the feasibility or non-feasibility of treatment depending on medication costs. It thus covers a number of motivating or inhibiting factors resulting from the environmental context (urgency of treatment, funding of medication costs) or relating to the utility of the information (its relevance to patient care).

The sixth barrier, personal initiative, can be seen to be part of the user's personal context, which includes psychological factors. The seventh, team dynamics, concerns the environmental context in which the physicians work, including their roles and responsibilities, and interpersonal relationships, which may be seen as part of the personal/psychological context. Good team relationships can have a positive psychological effect and act as a motivating factor, as illustrated in extract GR4:

– **Extract GR4**

"The learning climate ... greatly influenced the residents' motivation to pursue their clinical questions...

Sometimes when there's a really good team rapport, your whole motivation and your standards go up because everybody's really doing their work...

The degree of decision-making autonomy also influenced residents' information seeking behavior...

If you don't have control over that patient, you can come up with a really great answer, but if they're not used to using that drug and they're not comfortable with it, it's not going to get used... (Page 179)

The eighth barrier, institutional culture, is also a feature of the environmental context in which the physicians work.

All of these factors can thus be seen to be represented by concepts in the ISCM and they may act as barriers to information seeking, or inhibiting factors in the terminology of the ISCM.

Content analysis revealed no new concepts that would necessitate revision of the model. The majority of the coding terms listed in Table 2 were used in the content analysis, the main exceptions being terms related to information providers, and there was also little specific reference to communication. These findings are not surprising as the focus of the study was on physicians' information seeking behaviour rather than their communication activities or communications from external providers.

Green and Ruff summarized their findings in the following diagram representing the barriers to information seeking and use (Green and Ruff, 2005, page 180, Figure 1):
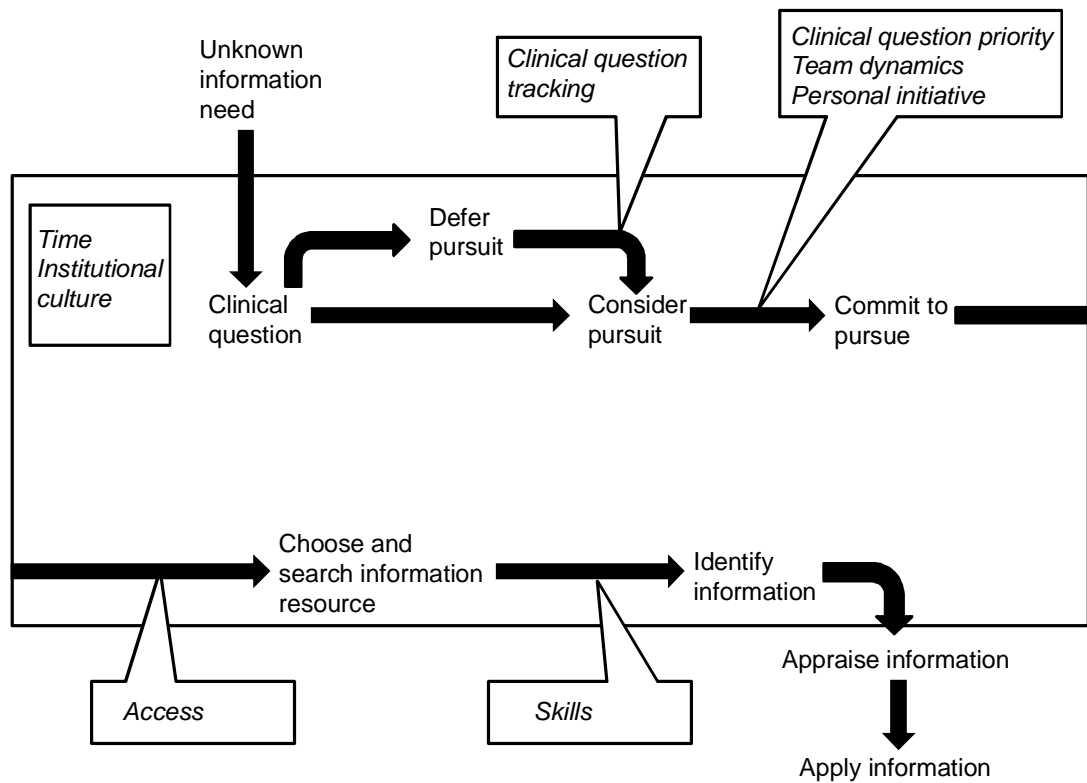
Figure 27. Conceptual model of barriers to answering clinical questions
(Green and Ruff, 2005)

The diagram shows the path that a resident physician follows when dealing with an information need and the barriers or inhibiting factors that influence his or her information behaviour at each step. The physician may have an information need relating to the management of a patient or an initially "unknown information need" arising from discussions with a colleague. The physician may initially defer the decision about seeking information. If so, the likelihood that the clinical question will subsequently be pursued is influenced by the physician's context, as suggested in the ISCM. In Green and Ruff's representation a particular barrier is the lack of an effective question tracking system, which as noted above can be represented in the ISCM as a source of inadequate utility in the physician's working environment (such as the "scraps of paper" referred to in Extract 2).

If the physician considers pursuing the information need, the decision is affected by motivating and inhibiting factors linked to the physician's context as shown in the ISCM. Green and Ruff here refer to three barriers: clinical question priority, team

dynamics and personal initiative. These factors are represented in the ISCM as environmental and personal aspects of the physician's context as discussed above.

In Green and Ruff's diagram a barrier to choosing and then using an information source is access. Similarly, the ISCM shows that choosing a source is influenced by its utility, one aspect of which is accessibility. Finding information then depends in part on the skills of the physician. Skills (or lack of skills) are shown as a barrier in Green and Ruff's representation. In the ISCM, skills form part of the user's personal context, which includes knowledge, education, training and experience, and the user's context affects all aspects of his/her information behaviour.

Green and Ruff's diagram also shows barriers of time and institutional culture, which the authors say "loom over the entire process". They add: "It is also noteworthy that attitudinal or cultural barriers may lead a resident to abandon the pursuit of a question". In the ISCM time constraints and culture are seen as part of the user's environmental context.

Finally the diagram refers to the physician appraising and applying information, steps which are shown in the ISCM as assessing and processing information followed by use of the information to take actions or decisions.

Thus the findings of this study endorse many aspects of the ISCM's representation of information behaviour and in particular:

- Information needs deriving from the user's context
- The influence on information seeking of the information user's context including environmental culture, time pressures, systems and facilities, team relationships, clinical knowledge, skill in searching and skill in assessing information
- The effects of motivating factors on information seeking
- Needs not being pursued because of inhibiting factors
- The influence of utility and credibility on the user's choice of sources and use of information
- The assessment, processing and use of information by the user

4.3.2.5 Hughes *et al.* (2010)

Study details

Hughes *et al.* (2010) studied 35 hospital- and clinic-based physicians in the UK, all of whom had qualified from medical school between 2 and 3 years previously and whom the authors therefore deemed likely to be regular users of the Internet. The aims of the study were to investigate the information searching behaviour of these physicians when using online sources and their judgements about information quality. Over a minimum of five days at work the physicians completed online diaries detailing the websites they had used, why they had used them and any negative or positive incidents when using the Internet. The researchers then carried out a semi-structured interview with each physician to obtain further details. The qualitative data from the diaries and interview transcripts were analysed by thematic analysis.

Content analysis and applicability of the ISCM

When the findings section of the report was subjected to content analysis it was found that the text could be adequately coded by the terms derived from the ISCM. Commonly occurring concepts included:

- Information
- Information sources, including providers and information products
- The information user, including the user's context (working environment, role and tasks, clinical knowledge and experience in using websites)
- The user's perceptions of sources
- The credibility or utility of information/sources
- Choosing sources
- Information seeking
- Assessing and processing information and using it to take actions or decisions

The majority of the coding terms listed in Table 2 were applicable, the main exceptions being terms related to information providers. The latter finding is unsurprising as the focus of the study was on physicians' information seeking behaviour rather than communications from external providers. No new concepts were identified from the analysis to suggest a need for revisions to the model.

The information needs that led to searching activities were of two main types: to obtain an answer to a particular clinical question or to find background information to increase knowledge as described in extract H1.

- **Extract H1**

"Doctors had two dominant types of information need or search task: to solve an immediate defined problem (e.g., "the best beta blocker to use for someone with heart failure") or to get background information on a subject. The former is to advance an immediate task in the clinical context and forms a closed question with a specific answer... The latter is an open question driven by the need to be knowledgeable about a subject... If it is a background or open question, then the impact on doctors' immediate decision making is reduced:

> *To get some background information on something that I'm not really familiar with ... It tends not have a big influence on my management plan...*

> *To find out information about something that I did not really know about, but not necessarily to make clinical decisions on how to treat a patient."* (Page 439)

This extract provides examples of the information user's context driving information needs as shown in the ISCM. The working or environmental context of the physician drives the need to find information about the best treatment for a particular patient. Both the working context and the personal context – the desire to increase knowledge and expertise – lead the physician to seek background information. The extract also demonstrates, again in accordance with the ISCM, that although those who seek information often use it to take decisions or actions this is not always the case immediately and another outcome may simply be an increase in knowledge (though this increased knowledge will influence future actions and decisions).

In the report the concept of bias in choosing sources was also frequently referred to. The authors found that physicians preferred to use websites with which they were familiar and which they believed would provide relevant information. They observed that physicians used search engines to navigate to such websites, referring to this behaviour as "a distinct pattern not clearly noted in previous studies, and might be known as 'known address bias'". This finding is illustrated in the following extract:

- **Extract H2**

This notion of address bias is used to orientate search engine use towards a site that the user believes may have appropriate information on the required subject, and if found in the search engine results, to navigate directly to that page within the preferred site. This was used by 48% of doctors...

> *I put what I'm looking for, and then I put eMedicine and Wikipedia, and I put that through Google...*

> *If there is syndrome that I haven't heard of, then I would type into Google with the exact phrase... I would select the Web sites that I have heard of...*
> (Page 439)

The ISCM suggests that the information user's choice of sources is influenced by a number of factors and in particular by the perceived utility and credibility of the sources and the information that they provide. The study findings corroborate this aspect of the model. In extract H2 physicians navigated to websites of perceived high utility, i.e. websites that they believed from past experience would provide information relevant to their needs. The perceived credibility of websites is also important, as illustrated by the quotations in extract H3:

- **Extract H3**

"I would trust it. It is written by doctors and generally reliable."

"There are various guides that you know are reliable, from word of mouth sites like NICE and BNF are accredited and evidence based. Things like Pubmed too."

"I would only take it from a valid or official Web site such as a university Web site or similar."

"If it is from someone famous in the field, you are more likely to pay attention. If there is no author there or you do not know who put it there, then you are less likely to give it any credit."

"You get introduced to sites by senior people that you respect and that use them; they tell you to use them." (Appendix, Pages 450-451)

As described in Chapter 3, credibility in the ISCM refers to perceived trustworthiness, reliability, accuracy and authority, and also to the concept of

homophily (Rogers, 2003) – that people are more likely to be influenced by those who are similar to them (homophilous) than by those who are different (heterophilous). Extract H3 shows that physicians may consider information to be trustworthy if it comes from a homophilous source – other physicians. They may also regard information as credible if it comes from sources recommended ("from word of mouth") by colleagues or from official sources such as NICE, the BNF (British National Formulary) or university websites. Credibility also relates to authority – "someone famous in the field" or "senior people".

The quotations in this extract seem to endorse the ISCM, but one of the authors' comments requires clarification. When discussing the way in which physicians judge information and websites, Hughes *et al.* state: "In looking at the criteria doctors apply, the credibility construct is not as useful as information quality or cognitive authority in detailing doctors' information judgments". This view arises from their terminology. As discussed in Chapter 3, the terms quality, credibility and cognitive authority used by Hughes *et al.* have much overlap in meaning. In the ISCM the broad terms credibility and utility encompass the concepts that underlie quality and cognitive authority. The study's findings confirm the importance of these two overarching characteristics of information and sources as represented in the ISCM

The ISCM suggests that, having found information, the user assesses and processes it, using it to take actions or decisions or to increase his/her knowledge. The study findings substantiate the model in this regard but also show that physicians often process information without properly evaluating it themselves (extract H4). Instead, they may assess information as credible because they obtain it from websites that they regard as reliable. Alternatively if information ties in with their existing knowledge they may judge it as appropriate without further investigation.

– **Extract H4**

> *"If they are sites I rely on anyway, then a lot of it I won't [validate] unless it's a point of specific interest. So, probably about 5–10% of the time I'll look at references and things...*

> *Generally when you are looking for something, say, for example, you want details of a particular symptom or disease, I vaguely know what to expect. If*

it seems sensible we use, which may not be very good practice, but it is something we do all the time...

As stated previously, these evaluative judgments were, in fact, very rare. Moreover, only a few participants actually reported retrieving information from a Web site new to them... Overall, the search process is highly biased towards sources of known information quality and cognitive authority...” (Page 441)

The findings of this study support several aspects of the ISCM's representation of information behaviour, including:

- The influence of the information user's environmental context (work) and personal context (lack of knowledge) in generating information needs
- The influence of the user's perceptions of utility and credibility on the choice of information and sources, and the influence of the user's environmental context on these perceptions
- Information seeking and the activities involved
- The user's use of information to take decisions or actions or to increase knowledge

4.4   Review of the Information Seeking and Communication Model

These findings indicate that the ISCM adequately represents key features of information users' behaviour and factors affecting it. However, the following modifications to the diagrammatic form of the model seem worthwhile.

The study by Reddy and Jansen (2008) described in section 4.3.2.1 refers to collaborative information behaviour and information sharing between users. To make it clearer that information behaviour may involve information seeking, processing of information and taking decisions and actions on a joint basis and to depict information sharing more explicitly, the model can be amended to show more than one "information user" box as in Figure 28, with a two-way arrow (arrow ⑦) to show information sharing between users. This revision also has the merit of showing the parallels between users and providers: just as there may be several providers, who may communicate with each other (arrow ⑤), there may be several users, who may communicate with each other (arrow ⑦).

The model shows the outcome of successful information seeking as actions or decisions. The "Actions Decisions" box is intended to represent examples of outcomes of information seeking. Another outcome may be filling gaps in knowledge as noted in the description of the ISCM in Chapter 3 and as found by Lacey Bryant (2004) and Hughes *et al.* (extract H1 above). To reflect this, the wording in the box can be changed to "Outcomes: actions, decisions, knowledge".

Finally, for consistency, it is appropriate to use similar wording in the two boxes referring to the handling of information. The model describes the handling of information received in communications as "Assess, use or ignore communication", whereas that for information found through seeking is "Assess and process information". The meaning of the latter can be clarified by changing the wording to "Assess, use or dismiss information".

The revised model incorporating all these changes is shown in Figure 28:
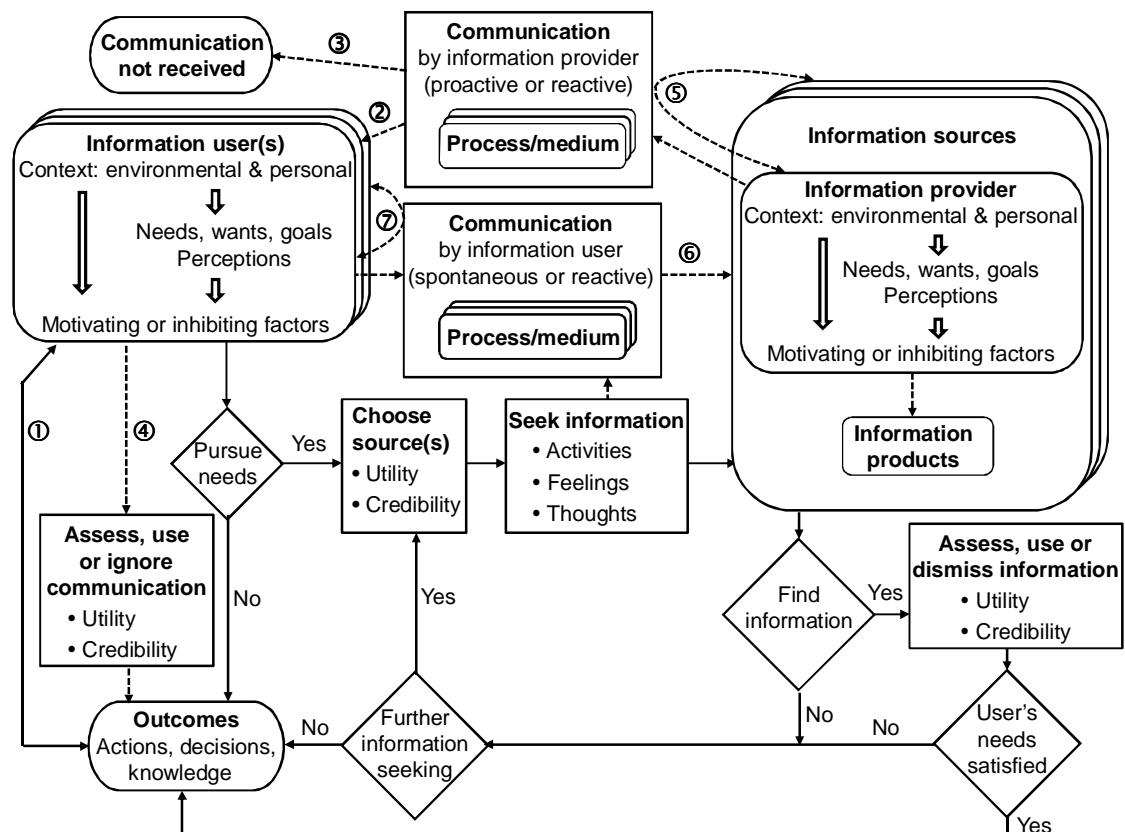
Figure 28. Revised information-seeking and communication model

4.5 Summary and conclusions

The review of the literature on the information behaviour of physicians provides support for most of the concepts underlying the Information Seeking and Communication Model. Detailed content analysis of five representative reports from the literature provides substantial evidence of the validity of the model as it applies to physicians.

According to the ISCM the information user's context, including the working environment (role, tasks, resources available, time pressures, culture and other factors) and personal environment (knowledge, training, experience, psychological and other factors), plays a fundamental role in the user's information behaviour. It not only stimulates the user's information needs, it also colours the user's perceptions of himself or herself, of others and of information and sources. The model shows utility and credibility of information and sources as particularly important perceptions affecting the user's choice of sources and use of information. Contextual factors also determine motivating and inhibiting factors that encourage or discourage the user when deciding whether or not to seek information. The five studies together provide evidence that all of this is true with regard to physicians' information behaviour. They provide examples of the activities of physicians in seeking information and some of the thoughts and feelings they may have as they seek information. They also provide examples of physicians' processing and assessing information and using it to make decisions, take actions or to increase their knowledge.

The model also depicts a two-way flow of information, as shown in Figure 26 and by the exchange of information between providers represented by arrow ⑤ in Figure 28 or between users represented by arrow ⑦. The user and provider roles are thus interchangeable: a user can become a provider and vice versa. This aspect of information behaviour was demonstrated in the study of Reddy and Jansen (2008), which reported that physicians and other health care professionals may act in collaboration to seek information, share it and use it together. The modified version of the ISCM in Figure 28 shows single or multiple information users to emphasize that information users do not necessarily act alone.

The literature reviewed here on physicians' information behaviour therefore endorses much of the model. However, it provides little or no detail about the

actions of external information providers, the contextual factors that affect them, their goals, or their activities in producing information products or in communicating. Evidence about the information behaviour of information providers and the validity of the model as applied to them was obtained by empirical research into the activities of pharmaceutical companies and the National Institute for Health and Care Excellence (NICE). This evidence is presented in Chapter 5.

Chapter 5

Testing the new model: information providers

5.1   Introduction

Having examined the relevance of the Information Seeking and Communication Model to the information behaviour of information users (physicians), it was necessary also to investigate its applicability to the information behaviour and activities of information providers. Two providers were selected because of their regular communication activities to physicians: the pharmaceutical industry and NICE, the National Institute for Health and Care Excellence (http://www.nice.org.uk/). Both the pharmaceutical industry and NICE put much effort into communicating with clinicians. The pharmaceutical industry does this through promotional activities, including advertising and visits by sales representatives, and by providing non-promotional information. NICE communicates with health professionals by mailing guidance on the treatment of diseases and the use of medicines to physicians and other health professionals. It also makes such information available on its website. In addition it is responsible for a number of other information and support services including NHS Evidence, which "empowers health and social care professionals by providing rapid access to the evidence-based information they need" (https://www.evidence.nhs.uk/about-us).

Investigating two types of information provider, which have different goals, provides a more robust test of the ISCM than could be achieved by using the model to study the information behaviour of just one of them. In particular because the ISCM shows the great influence of context on information behaviour, it is of interest to examine how the differing contexts of the two providers, including their perceptions (of themselves and of each other) affect their behaviour.

5.2   The pharmaceutical industry

The research-based pharmaceutical industry is the single biggest sponsor of medicines research in the UK and the USA and is thereby the largest generator of information about new medicines (Collier and Iheanacho, 2002). Such information includes the findings from clinical trials, most of which are sponsored and designed

by pharmaceutical companies (Goldacre, 2012, page 172). The industry spends heavily on information products and activities aimed at health care professionals, including advertisements, presentations by sales representatives, websites and responses to enquiries. It has been claimed that "Although the primary function of drug companies is to develop and market drugs, these companies spend more time and resources generating, gathering, and disseminating information" (Collier and Iheanacho, 2002).

In the UK the main purchaser of prescription medicines is the National Health Service, which spends more than £12 billion a year on medicines (ABPI Code of Practice for the Pharmaceutical Industry, second 2012 edition). As pharmaceutical companies are sponsors and producers of much of the research evidence for new medicines, it is important that they make that evidence available to the NHS as soon as possible and that users in the NHS are able easily to access it, evaluate it and use it in clinical decision-making. In the words of the Standing Committee of European Doctors and the European Federation of Pharmaceutical Industries, "Cooperation between the medical profession and the pharmaceutical industry is important and necessary at all stages of the development and use of medicines to secure safety of patients and efficacy of therapy ... Information given to physicians by the industry is essential for good pharmaceutical management of patients" (http://www.efpia.eu/sites/www.efpia.eu/files/EFPIACPMEJointdeclaration.pdf).

When healthcare professionals refer to information provision by the pharmaceutical industry, however, they often focus on advertising and promotional information and question its value or they claim that the industry supplies biased information (Collier and Iheanacho, 2002; Lexchin, 1993; Melander *et al.*, 2003; Shaughnessy and Slawson, 1996). Pharmaceutical companies are of course driven by commercial goals: they develop and market medical products in order to make profits. The information that they disseminate about those products is often promotional in nature, emphasizing the benefits that they can provide in the treatment of patients. The aim of pharmaceutical advertising and other marketing activities is to encourage physicians and other health care professionals to prescribe or use a particular company's product(s). Companies' activities in this regard have led to concerns about the influence of the industry and its motives. The Royal College of General Practitioners, for example, commented: "There is a perception amongst professionals and the public that the pharmaceutical industry's drive for profit has overridden considerations of honesty, openness, and cost-effectiveness" (Royal

College of Physicians, 2009, page 9). Such concerns also relate to the influence of information provided by opinion leaders employed by pharmaceutical companies: "The information available to doctors and the public is greatly influenced by an elite group of key opinion leaders. These doctors are often respected clinical investigators or specialists who may be paid to speak or write on behalf of a company. Their views are often promoted as considered expert opinion about a particular medicine and its efficacy and safety" (Royal College of Physicians, 2009, page 15).

However, pharmaceutical companies also provide factual, non-promotional information, for example at scientific meetings and through their medical information departments in response to requests for information (Robson and Riggins, 2001). Provision of information by the UK industry is governed by the Human Medicines Regulations 2012 (http://www.legislation.gov.uk/uksi/2012/1916/contents/made). Most companies also agree to comply with the ABPI Code of Practice for the Pharmaceutical Industry (http://www.pmcpa.org.uk/thecode/). Among other requirements, the ABPI Code stipulates that "Information, claims and comparisons must be accurate, balanced, fair, objective and unambiguous and must be based on an up-to-date evaluation of all the evidence and must reflect that evidence clearly. They must not mislead either directly or by implication, by distortion, exaggeration or undue emphasis" (Clause 7.2).

Because of the potentially important role of pharmaceutical companies in supplying evidence about medicines to health care professionals it is of interest to investigate the validity of the ISCM in representing their behaviour as information providers. This is particularly so because of the concerns expressed about the industry's commercial motives and possible bias in the information it produces.

5.3   NICE

NICE was established by the UK government in 1999 as the National Institute for Clinical Excellence to "reduce variation in the availability and quality of NHS treatments and care" (http://www.nice.org.uk/aboutnice/whoweare/who_we_are.jsp). Upon taking over the functions of the Health Development Agency in 2005 the full name of NICE changed to the National Institute for Health and Clinical Excellence. In April 2013 it took on responsibility for developing guidance and standards in

social care and its name changed to the National Institute for Health and Care Excellence.

NICE provides various types of guidance and recommendations on clinical practice to health care professionals including the following (details are from the NICE website, http://www.nice.org.uk/):

- Clinical guidelines – "recommendations on the appropriate treatment and care of people with specific diseases and conditions within the NHS in England and Wales. Clinical guidelines are based on the best available evidence"
- Technology appraisals – "recommendations on the use of new and existing medicines and treatments within the NHS in England and Wales"
- NICE quality standards – "a concise set of statements designed to drive and measure priority quality improvements within a particular area of care. NICE quality standards are derived from the best available evidence such as NICE guidance and other evidence sources accredited by NICE"
- NICE Pathways – an online tool that provides "access, topic by topic, to the range of guidance from NICE, including quality standards, technology appraisals, clinical and public health guidance" (http://pathways.nice.org.uk/)

NICE is also responsible for NHS Evidence, a web-based search tool and portal that provides access to "authoritative clinical and non-clinical evidence and best practice ... It helps people from across the NHS, public health and social care sectors to make better decisions as a result" (https://www.evidence.nhs.uk/about-us).

The above quotations from its websites illustrate NICE's contention that the guidance it issues is based on "the best available evidence" and that it improves clinical practice and decision making. It plays a key role in determining what the "best" evidence is and which treatments should be used in the NHS.

NICE also emphasizes its independence and that of its guidance: "The National Institute for Health and Care Excellence (NICE) is the independent organisation responsible for developing national guidance, standards and information on providing high-quality health and social care ... All of our guidance, quality standards and other advice products are independent and authoritative" (http://www.nice.org.uk/media/89C/8E/NICE_Charter.pdf). The NHS also views NICE as independent: "The National Institute for Health and Clinical Excellence

(NICE) is an independent organisation that provides national guidance and standards on the promotion of good health and the prevention and treatment of ill health" (http://www.nhs.uk/NHSEngland/thenhs/healthregulators/Pages/nice.aspx).

However, claims about the independence of NICE need to be qualified. It was originally set up as a Special Health Authority within the NHS under the direction of the Secretary of State for Health. Following its reorganization in April 2013 it has become a Non Departmental Public Body established in accordance with the Health and Social Care Act 2012 (http://www.legislation.gov.uk/ukpga/2012/7/contents/enacted). The NICE website states that "operationally we are independent of government" (http://www.nice.org.uk/aboutnice/whoweare/who_we_are.jsp). NICE is, however, accountable to its sponsor department, the Department of Health, and the Chair of NICE is directly accountable to the Secretary of State for Health. The Health and Social Care Act requires that NICE, in producing its guidance, "must have regard to the broad balance between the benefits and costs of the provision of health services or of social care in England". Thus an important part of its remit is to help ensure that treatments are cost-effective. This has led to criticisms suggesting that its recommendations are not entirely impartial: "It is widely acknowledged that many of NICE's appraisals have been successful, and have driven up standards in the NHS - along with other elements of the quality agenda introduced since 1997. At the heart of the majority of criticisms of NICE, however, is the requirement that its decisions reflect the cost effectiveness of treatments: this, it is argued, means that its clinical recommendations are inextricably tied up with political decisions about value for money" (http://www.politics.co.uk/reference/national-institute-for-health-and-clinical-excellence).

In view of the very important roles that NICE plays in determining the best evidence about treatments and in providing guidance on appropriate clinical practice within the NHS it is of interest to use the ISCM to study its behaviour as an information provider.

5.4   Methods

In order to gain in-depth insights into information providers' views of their roles and activities, qualitative interviews were carried out with employees of a selection of pharmaceutical companies in the UK and with staff working for NICE. "The qualitative interview is a key venue for exploring the ways in which subjects

experience and understand their world. It provides a unique access to the lived world of the subjects ..." (Kvale, 2007, page 9). Semi-structured interviews were held with UK-based staff in pharmaceutical companies. Similar interviews were held with staff at NICE who are involved in the provision of guidance and information to NHS doctors.

5.4.1 Interview and coding procedures

To provide structure to the interviews and ensure that each participant was asked about the same topics, the interview guide in Box 1 was used for staff of pharmaceutical companies and the similar guide in Box 2 was used for NICE staff. Because the aim was to test the validity and applicability of the Information Seeking and Communication Model the questions sought to explore elements of information behaviour suggested by the model. They covered the interviewee's context including role and background, the information provided by the organization (pharmaceutical company or NICE) for physicians, its aims or goals in doing this, and the perception in the organization of physicians' information needs and of appropriate information sources. The interview guide for pharmaceutical company staff also included a question about their perceptions of the distinction, if any, between advertising and information provision. In the ISCM credibility and utility of information and sources are important factors affecting information behaviour. Interviewees were therefore asked about the credibility of information sources and how this might be judged and how communication or provision of information could be improved to increase its utility. NICE uses information about clinical trials that is provided by pharmaceutical companies when producing its appraisals of medicines. Pharmaceutical companies in turn use information from NICE such as clinical guidelines and appraisals of medicines. Because of their reciprocal roles as information providers and users, and because of their different contexts and goals, it was also of interest to explore their perceptions of each other. Finally, because one of the objectives of the research was to use the ISCM to identify ways in which information behaviour may be improved in the context of evidence-based medicine, interviewees were encouraged to talk about their organization's perspective on EBM. Participants were encouraged to talk freely, to elaborate on any topic and to raise additional topics of relevance.

Box 1. Interview guide for pharmaceutical company interviews

1. What is your role and what is your background?

2. From your perspective, what would you say are the main information needs of a doctor in the NHS when considering the use of a medicine?

3. What role does your company play in meeting doctors' information needs?
   - What are your company's aims in providing information for doctors?
   - How far is your company's role in this respect guided by an understanding of doctors' needs for information?

4. Do you distinguish between advertising and promotion on the one hand and information on the other? If so, what is the distinction?

5. Where else or who else do you think it's appropriate for doctors to get information from with regard to medicines?

6. How do you view information provided to doctors by NICE, compared with that provided by the pharmaceutical industry?

7. What criteria do you think can be used to judge the credibility of information?
   - Is some drug-related information more credible than other information?
   - *If yes:* What makes it more credible in your view?

8. How credible is information provided by the pharmaceutical industry?
   - Does it have any particular bias?

9. How does the credibility of information provided by pharmaceutical companies compare with that provided by NICE?

10. Do you think that the pharmaceutical industry can improve the way in which it communicates with doctors?

11. Do you think that NICE can improve the way in which it communicates with doctors?

12. Do you have any other comments or observations concerning any of the topics we have discussed?

    Prompt: What is your and your company's perspective on evidence-based medicine? What is the place of information from the pharmaceutical industry in today's environment of evidence-based practice and evidence-based medicine?

Box 2. Interview guide for NICE interviews

1. What is your role in NICE and what is your background?

2. From your perspective and that of NICE, what would you say are the main information needs of a doctor in the NHS when considering the use of a medicine?

3. What role does NICE play in meeting doctors' information needs?
   - What are NICE's aims in providing information for doctors?
   - How far is NICE's role in this respect guided by an understanding of doctors' needs for information?

4. Where else or who else do you think it's appropriate for doctors to get information from with regard to medicines?

5. From your perspective and that of NICE, is it appropriate for the pharmaceutical industry to provide information to doctors?

6. What criteria do you think can be used to judge the credibility of information?
   - Is some drug-related information more credible than other information?
   - *If yes:* What makes it more credible in your view?

7. How credible is information provided by NICE?
   - Does it have any particular bias?

8. How credible is information provided by pharmaceutical companies?

9. Do you think that NICE can improve the way in which it communicates with doctors?

10. Do you think that the pharmaceutical industry can improve the way in which it communicates with doctors?

11. Do you have any other comments or observations concerning any of the topics we have discussed?

   Prompt: What is NICE's perspective on evidence-based medicine?

Interviews were carried out by telephone to minimize inconvenience to the participants and in the hope of encouraging participation. Telephone interviewing in qualitative research has been reported to be capable of producing comparable results to those from face-to-face interviews (Sturges and Hanrahan, 2004). The interviews were recorded, with permission from the interviewees, and were then transcribed. The transcripts were sent to the interviewees to check for accuracy.

Deductive content analysis (Hsieh and Shannon, 2005; Elo and Kyngäs, 2007) as described in section 4.3.1 above was carried out on the transcripts. Coding terms derived from the ISCM (Table 2) were used to analyse the transcripts, which were read in detail and each portion of text referring to features of information behaviour or factors affecting it was coded with relevant terms. To try to ensure consistency in coding the use of coding terms was compared between transcripts. In addition four of the transcripts were coded twice at intervals of several months to check for possible discrepancies but no major differences were found. If any text did not seem to be adequately represented by the existing codes a new term was added. At the end of the analysis, new terms and the concepts they represented were reviewed to determine whether modifications to the model were needed.

5.4.2 Interview participants

As this is a qualitative study, the number of interviewees was not specified in advance. "To the common question about interview inquiries, 'How many interview subjects do I need?', the answer is simply: 'Interview as many subjects as necessary to find out what you need to know.'" (Kvale, 2007, page 43). The interview transcripts were analysed on a continuing basis and new interviewees were included until:

- enough information had been gathered to assess the model;
- a clear picture had been obtained of the perspectives from NICE and from the pharmaceutical companies; and
- no further insights were likely.

Seventeen pharmaceutical companies were selected, representing a mix of large, medium and small companies with headquarters in the UK, Europe, the USA or Japan. Details of the research project were sent by email to the UK offices of the companies inviting them to participate and to nominate an experienced member of staff from the medical department and another from the marketing department to be

interviewed. The reason for inviting participation from the two departments was to obtain different perspectives. The medical department in a pharmaceutical company is normally responsible for providing factual medical information in response to enquiries from health professionals (Robson and Riggins, 2001), while the marketing department is responsible for the company's advertising and promotional activities (Levy, 1994).

Thirteen members of staff from ten companies agreed to participate – one person from each of seven companies and two from each of the other three companies. Of the ten participating companies, two have headquarters in the UK, four in the USA, two in Germany, one in Switzerland and one in Japan. Table 3 provides demographic and other information about the interviewees.

Interviewee	Sex	Education/ qualification	Job function	Industry experience (years)	NHS experience (years)
A	M	Physician	Medical	3	4
B	M	First degree	Marketing	8	0
C	F	Physician	Medical	14	8
D	M	Physician	Medical	8	7
E	F	First & master's degrees	Marketing	7	0
F	F	Master's degree	Compliance	23	0
G	M	Physician	Medical	14	15
H	F	Pharmacist	Marketing	25	0
J	F	Physician	Medical	6	6
K	M	Physician	Medical	14	13
L	F	First degree	Medical	30	0
M	M	Nurse	Marketing	10	Not stated
N	F	Pharmacist	Medical	9	10

Table 3. Industry interviewees: demographic and other data

Nine of the interviewees were from medical or compliance departments (the compliance function having responsibility for ensuring a company's compliance with legal requirements and regulations and with the pharmaceutical industry's codes of practice) and four were from marketing/sales departments. Six were male (46%) and seven were female (54%). All 13 had degree-level or higher qualifications and nine were qualified heath care professionals: six were physicians, two were pharmacists and one was a nurse. Their experience in the pharmaceutical industry ranged from 3 to 30 years (mean 13.2 years). Eight of the nine who had qualified as health care professionals had spent between 0 and 15 years in the NHS (mean 7.9 years) before moving to the pharmaceutical industry; the ninth interviewee did not provide this information. Thus the majority of the interviewees had experience of working in both the pharmaceutical industry and the NHS.

The final interviews revealed no further insights beyond those gained from the earlier interviews, suggesting that the sample size was adequate to provide a representative selection of companies' views.

For the interviews with NICE 16 members of staff in a variety of roles were initially contacted, of whom four agreed to participate. Subsequently two further potential interviewees were identified and one agreed, bringing the total number of interviewees to five, a response rate of 5/18 or 28 per cent.

Table 4 provides demographic and other information about the interviewees. They covered a range of roles as follows:

- One was concerned with the production of clinical guidelines providing NICE guidance for health care professionals on the management of patients and treatment of different illnesses

- Two were involved in assisting with the implementation of NICE guidance within the NHS

- One was a manager in charge of user research for NHS Evidence, a major information resource provided by NICE (http://www.evidence.nhs.uk/)

- One led the enquiry handling team that deals with questions from healthcare professionals, researchers and the public about NICE and its guidance

Interviewee	Sex	Education/ qualification	Job function	Time at NICE (years)	NHS experience (years)*	Other career experience
P	M	Pharmacist	Implementation of guidance; education	3	34	Marketing, public relations
Q	F	First degree	Enquiry handling and communications	4	7	
R	F	First degree and MBA	Implementation of guidance	3	10	Marketing, consultancy
S	F	First degree	User research, NHS Evidence	3	15	
T	F	Physician	Overseeing production of guidelines; strategy	3	24	

* Including time at NICE

Table 4. NICE interviewees: demographic and other data

Four interviewees were female and one was male. All had degree-level or higher qualifications and two were qualified heath care professionals: one physician and one pharmacist. They had worked at NICE for between 3 and 4 years (mean 3.2 years). Their working experience within the NHS (including their time at NICE) ranged from 7 to 34 years (mean 18.0 years). They therefore had extensive experience of the NHS and of NICE. Two also had career experience from outside the NHS. One had been employed in marketing and public relations roles for Help the Aged and the Health Protection Agency. The other had worked in marketing in a chemicals company, then worked for a non-profit organization and was subsequently self-employed as a consultant. None of the interviewees had worked in the pharmaceutical industry.

It had been anticipated that only a relatively small number of interviewees would be needed from NICE because it is a single organization with a consistent goal in its communication with physicians to provide guidance and advice that are "based on the best available evidence and set out the best ways to prevent, diagnose and treat disease and ill health" (http://www.nice.org.uk/media/89C/8E/NICE_Charter.pdf). This supposition proved to be correct as the final two interviews revealed no insights

into information behaviour that had not already been identified in the earlier NICE interviews.

The mean length of the 18 interviews was 52 minutes, ranging from 28.6 minutes (for an interviewee who could spare only half an hour) to 1 hour 17 minutes. The transcripts from the interviews amounted to over 100,000 words for analysis. To provide a representative overview of the findings and to help readers judge the trustworthiness of the analysis an extensive selection of quotations from the interviews is provided in the following sections. As Baxter and Eyles (1997) note, "Quotations are important for revealing how meanings are expressed in the respondents' own words rather than the words of the researcher." They also comment: "While there need not be a model for the size and number of quotations, it is reasonable to expect some discussion why particular voices are heard and others silenced through the selection of quotes." Quotations from all the interviewees are included in the following sections.

5.5   Findings from analysis of the interviews

In the content analysis most of the key concepts from the model were found. Representative extracts from the transcripts are given here grouped under the following headings derived from the ISCM:

5.5.1 The information provider, context and related factors
5.5.2 The information user, context and related factors
5.5.3 Information sources, information products
5.5.4 Information seeking
5.5.5 Communication, process and medium
5.5.6 Credibility and utility

The relationship to the model of some concepts identified in the transcripts merits further discussion and these are considered in section 5.5.7.

In the following sections extracts from the transcripts are reproduced, each interviewee being identified by a letter, A to N for those from pharmaceutical companies and P to T for those from NICE. Under each of the headings listed above, extracts from the interviews with pharmaceutical companies are given first and then extracts from the interviews with NICE.

There has been much discussion about standards for qualitative research and various criteria have been suggested for judging its quality (Anfara et al., 2002; Cohen and Crabtree, 2008; Graneheim and Lundman, 2004; Lincoln and Guba, 1985). Booth and Brice (2004) suggest three main criteria for appraising qualitative research:

- *Validity* of the findings based on the study design and methods – "the extent to which the results of the research are likely to be free from bias"
- *Reliability* – the trustworthiness, credibility and reproducibility of the results
- *Applicability* – the usefulness of the findings in practice

Cohen and Crabtree (2008) reviewed the published literature on criteria for evaluating the quality of qualitative research. From this they noted that the *validity* of research may be judged as follows: "Hallmarks of high-quality qualitative research include producing a rich, substantive account with strong evidence for inferences and conclusions and then reporting the lived experiences of those observed and their perspectives on social reality ... The goal is understanding and providing a meaningful account of the complex perspectives and realities studied."

With regard to the *reliability* of qualitative research, Cohen and Crabtree reported that one approach to evaluating it is "a process negotiated between researchers and readers, where researchers were responsible for reporting information (eg, data excerpts, how the researcher dealt with tacit knowledge, information about the interpretive process) so readers could discern for themselves the patterns identified and verify the data, its analysis and interpretation." Alternatively, "steps to establish dependability should be built into the research process to repeat and affirm researchers' observations."

To help substantiate the *validity* of the content analysis in this thesis, full details of the methods have been given above and, to give "a rich, substantive account", an extensive selection of quotations from the interviews is provided in the following sections. Within each section the meanings within the interview quotations are related to the ISCM to provide the evidence on which the conclusions about the relevance of the model are based. The *reliability* of the analysis may also be demonstrated by this extensive selection of quotations, offering readers the opportunity to "discern for themselves the patterns identified and verify the data, its analysis and interpretation." The analysis itself aims to show the *applicability* of the

findings and of the ISCM. The trustworthiness of the findings from this research is discussed further in Chapter 7.

5.5.1 The information provider, context and related factors

The ISCM suggests that contextual factors have a fundamental influence on the provider's information behaviour. Such factors include the environment and culture in which the provider operates and, on a personal level, the role of the individual in a provider organization. Related to the context are the provider's needs, wants, goals, perceptions and motivating and inhibiting factors. The findings from the content analysis confirmed the importance of context and contextual factors and endorsed this aspect of the model. The following sections, 5.5.1.1 and 5.5.1.2, provide examples from the interviews with pharmaceutical companies and NICE.

5.5.1.1 Pharmaceutical industry interviews

A defining element of a pharmaceutical company's context is that it is a commercial organization that is in business to make a profit – without profits a company will not survive – and a prime reason why companies issue information is to promote sales of their products. This is clear from the following extracts.

− **Extract B11**

    I head up a marketing team with six direct reports that manage the two products that sit within our portfolio ... It's my role to manage the promotional messaging and information that lands to all stakeholder groups both internal and external in order to drive appropriate uptake of that medicine with patients.

− **Extract E11**

    I will be responsible in the main for promotional material which concerns our brand and obviously we work with our med affairs team when it's to do with education in the disease area, or that sort of thing. Internally we obviously have a voice in what priority we communicate the educational factors which support the area which our brand plays in

- **Extract K53**

With promotion you're selecting key benefits that you think are particularly going to strike a note, resonate with the prescriber and so you are focusing particularly on some benefits that maybe give your drug an advantage in the class or in the therapy area. Whereas information is more of a balance, there's no particular emphasis on any one part of the drug's profile.

- **Extract F101**

At the end of the day we're a commercial company, so yes we want to sell our drugs

The two marketing managers quoted in extracts B11 and E11 see their responsibilities as being to manage "promotional messaging", "drive appropriate uptake" of the company's medicines and to support the "brand". Extract K53 distinguishes between the promotional and non-promotional information that a company produces, noting that the former focuses on the "benefits" of the company's product compared with other medicines whereas the latter is more balanced. These quotations illustrate how the commercial nature and goals of a company influence much of the information it provides for physicians and other health care professionals, a fact concisely summarized in extract F101.

There are other important contextual factors that affect pharmaceutical companies' information behaviour and moderate a purely commercial approach to information provision. The pharmaceutical industry operates in a heavily regulated environment and has to comply in its activities with legislation including the Human Medicines Regulations 2012 (http://www.legislation.gov.uk/uksi/2012/1916/contents/made), which regulate the advertising and promotion of medicines. The industry's self-regulatory code, the ABPI Code of Practice for the Pharmaceutical Industry (http://www.pmcpa.org.uk/thecode/), sets out requirements and standards for advertising, promotional activities and the provision of information that accord with the various legal and other requirements. Under the ABPI Code companies are required to review advertising and promotional material and to certify that it complies with these requirements. Senior staff members within the company are responsible for certifying material and at least one of them must be medically qualified or a pharmacist. The following extracts illustrate companies' procedures in this regard.

- **Extract J11**

Most pharmaceutical companies have a medical team, a medical department, and within the medical department will sit physicians that are medically qualified that have moved out of practising clinical medicine into industry. So their role is around ethical obligations, ensuring that practices around promotion, around material that's provided externally is suitable both from an ethical perspective and also compliant with the UK Code of Practice

- **Extract N71**

We in the industry have the ABPI Code, which we must adhere to. And obviously any promotional claim or any data that is included in any promotional material is reviewed by a medic – doctor or pharmacist – and goes under internal review by a number of individuals to ensure that that claim is not ambiguous, there's no hanging comparisons for example, it can be substantiated by data and it in no way puts patient safety at risk.

- **Extract H63**

The medic team and the medical director who actually approve our final bits of material, they are trying to absolutely take out that bias and they will question us if it comes over ... they will definitely push it back if they can see any bias.

- **Extract F11**

Business Compliance Director, which means ABPI Code-related – keeping us as clean as possible with regard to Code issues; responsible for all of the SOPs that may fall out of the Code; and liaising with our Europe regional compliance team, because a lot of our directives and SOPs are European that we have to work with ... I get heavily involved with our ... anti-bribery testing is probably the broader term these days with the UK Bribery Act and the Foreign Corrupt Practices Act testing we have to do, business control function testing ... so we have quite strict controls.

Thus companies' information behaviour is influenced not just by their internal context and goals but also by the external context in which they operate, including legal requirements.

The ISCM also refers to personal context, training, experience and job role as possible influences on information providers' behaviour. Extracts J11 and N71 refer to an important role of senior staff who are qualified physicians or pharmacists in reviewing promotional and other material to ensure compliance with the ABPI Code of Practice and with appropriate ethical standards. Extract H63 is a quotation from a marketing manager suggesting that marketing staff may produce information that is biased and, if so, that the medical reviewer will "push it back".

The company context or culture is not purely commercial: ethical considerations and a concern for patients also have an important influence as is evident from the following extracts.

– **Extract C31**

First and foremost we have a responsibility ... The responsibility, certainly in the medical mind, is very much framed around the risk-benefit profile, to absolutely make sure that if a patient's getting a medicine, then the patient's not being put at undue risk as a consequence of that decision. We do that by influencing and shaping the sales conversation – and the materials of course. We do that by the supply of the medical information service. And for specialists' needs particularly we do that by the supply of medical science liaison staff who engage in a deeper, more scientific conversation

– **Extract E34**

Interviewer: So you need to try to reduce the risk of problems with potential toxicity or side-effects of a product occurring – is that right?

Interviewee: Absolutely, yes, and for the obvious reason of the positive experience for the patient and the physician of our product, and of course the clear responsibility we have as a pharmaceutical organization or company or even as an industry, it's the standard at which we work. So it's almost like breathing, it is what we do – we have to make it clear. We wouldn't obviously be putting products on the market if they weren't safe either.

– **Extract K28**

Interviewer: What are your company's aims in providing information for doctors?

Interviewee: I think the same aims as any company, which is to be accurate, balanced, fair, objective, and point out the pros and the cons and make sure that patients are getting the right medicine at the right dose. I mean ultimately it does not benefit [the company] – in fact it's to their detriment – if patients suffer adverse events on our medicines. So from not only ... hopefully from primarily an ethical standpoint but also from a business standpoint we want to enjoy a good reputation amongst healthcare professionals and patients. And therefore it's really important that the old cliché, the right medicine to the right patient at the right time in the right dose actually happens.

- **Extract N12**

Speaking from medical and scientific affairs, the aim that we would have ultimately is to ensure that the drug is used for the benefit of patients in the most efficacious and safest manner, and putting the patient at the centre of what we do.

The extracts discussed so far also illustrate two other important features of information behaviour shown in the ISCM: motivating and inhibiting factors. Commercial goals can be seen as motivating factors leading to the production of promotional information, while legal or code of practice requirements and ethical considerations can be seen as inhibiting factors that moderate what is permissible in advertising claims.

According to the ISCM, perceptions also play an important role in information behaviour. Several interviewees expressed their perception that the pharmaceutical industry has a generally poor image among health care professionals and the public (see also section 5.5.2.1):

- **Extract B43**

One thing that the industry has suffered from, particularly over the last decade is a poor reputation when it comes to credibility and trust. I think this is one area that we need to tackle head on.

- **Extract F25**

I think we're just still seen as big bad people, nasty people – that we're trying to take their money ... high cost drugs.

- **Extract J71**

I feel it [information from the pharmaceutical industry] is quite credible but I think the external perspective is – if you read the general lay press, or when you speak to the healthcare professionals – they feel it's not as credible because there is this perception that companies are not telling the truth.

- **Extract L41**

I still think that a lot of information we produce is always viewed sceptically by the medical profession

The following extract suggests that this perception of a negative image of the industry is leading to a change in approach to communication:

- **Extract D102**

The sales reps model has been shown recently to have failed. It might have worked in the past but the number of sales reps is half what it used to be and there's a good reason for that and that's because doctors don't listen to them because they aren't credible. And also doctors aren't decision makers any more to a degree. So, the provision of scientific information, appropriate information, unspun – warts and all – is what the industry needs to do.

In the next two quotations, both from the same interviewee, the traditional method of communication by sales representatives using "key messages" is contrasted with a "two-way dialogue" approach in which the representative seeks to provide information relevant to the physician's needs. Such two-way dialogue is represented within the ISCM in Figure 26.

- **Extract B24**

Sales representatives were telling doctors what the key messages were for a medicine and those messages would be in effect trying to penetrate a very noisy environment compared to other pharmaceutical companies who would be doing exactly the same. So it was very old school traditional top-down ... producing messages that tell the customer what to do.

– **Extract B31**

So instead of simply bombarding or telling customers the key messages it's much more about trying to drive two-way dialogue, to understand specifically how this medicine can support what that individual physician is looking to do.

This change in approach to communication was also reflected in comments from other interviewees:

– **Extract C22**

So it's a much more balanced conversation based upon the needs of ... the working needs of the prescriber rather than the selling needs of the pharma rep. That's the conversation that we get really good market research and feedback off of.

– **Extract F31**

They [representatives] are expected to be able to hold a reasonably intelligent conversation with their customer these days, whereas in the old days they'd go in with a detail aid and they'd literally quote the detail aid at them. We expect them to be better than that now. For example in our diabetes area we have a course with [a] university that all our representatives are expected to take, in the diabetes arena, so we make sure they actually understand the disease area rather than just going in and selling the drug.

– **Extract E54**

So, particularly in secondary care, I think that the value now is not about just selling the key messages and the key information, it is about having a discussion about patient pathways, about service provision, about reimbursement, about formulary access – it's much more a business approach. And integrated into that is why you are there, which is to sell your product.

As suggested by the above extracts, companies' perceptions of physicians' needs have a major influence on the information that they provide and how they communicate it

– **Extract C44**

The information that's supplied as part of our sales and marketing efforts is very much guided by our understanding based on research on what doctors' needs are. That is supplemented to varying degrees by the question profiles that come through from Med Info – not as much as I would like it to do but actually monitoring that across the system so the type of questions that are being asked is pretty challenging. If Med Info become aware of a consistent theme, then that is shared through so that we can have proactive communication by the front line on that.

– **Extract G22**

In an ideal world you'd hope that we are meeting the needs of what the scientific community wants to hear about our products. It's probably – with any company that I've worked for – a balance between ... balancing that need and the needs for information and knowledge about our products we would like to be out in the community. So often we do take into account the needs of our customers as well.

– **Extract N11**

They want accurate, balanced information, not promotional information – primary publications, randomized placebo-controlled study standard, the gold standard, as you would expect. The usual grading of what is evidence-based – so basically evidence-based medicine. We know what the gradings are, what's the gold standard. So I think if we asked any of our key opinion leaders, they would rather see a primary published big study that's powered to prove the primary end-point. And robust safety data.

The ways in which companies form their perceptions about physicians' needs are discussed in section 5.5.4.1 below.

The analysis of the interviews from the pharmaceutical industry supports the validity of the ISCM's depiction of context, goals, perceptions and motivating and inhibiting factors as key influences on an information provider's behaviour. Further support for the model is provided by the findings from the NICE interviews.

5.5.1.2 NICE interviews

The context in which NICE operates is different from that of the pharmaceutical industry. NICE (http://www.nice.org.uk/aboutnice/whoweare/who_we_are.jsp) was established by the UK government in 1999 to provide guidance on treatments and care provided in the NHS, with a requirement that treatments should be cost-effective (Secretary of State for Health, 2005). The following extract shows that in issuing information NICE is guided by its remit from the Department of Health. Thus the environmental context in which NICE operates – working for the NHS with a remit to rationalize treatments and ensure cost-effectiveness – drives its communication activities, and the information it produces is not necessarily designed to meet the needs of individual physicians.

– **Extract R42**

We're more the servants of the Department of Health I suppose than we are of the doctors and practitioners who use our guidance. I think doctors could perfectly well get on and treat patients without any guidance from NICE but the health service couldn't survive if they did. The reason we produce the guidance is actually for the good of the NHS as a whole. So providing information to doctors is a by-product of the fact that we have to provide information to the NHS. The process by which guidance is written is not constrained by what it is that practitioners need to know – it's constrained by a set of rules and processes about how NICE evaluates evidence and how it uses expert opinion to come to its conclusions about what is cost- and clinically effective. That is not driven by the information needs of doctors.

From the ISCM it may be predicted that differences between the provider's context and that of the information user could lead to a mismatch between the information provided by a provider and that needed by users. Extract R42 suggests such a mismatch, and the distinction between NICE's environmental context and that of health care professionals is also noted in the following two extracts.

– **Extract T31**

Well I think sometimes content is at odds with what people want. I think we're quite often perceived as doing things in an overly academic ivory tower type of way and what we do isn't necessarily tailored to a more generalist audience.

Thinking about clinical guidelines, we have a larger suite of guidelines that are applicable to say secondary care than to primary care.

- **Extract S52**

We're a bit separated from that at NICE – from the real world. It's a little bit ivory tower. It's not quite university ivory tower, I feel that we're somewhere in between. We've got a little bit of a foot in the NHS and a little bit of a foot in the academic ivory tower. I think that if we can move ourselves closer towards practice and understanding practice issues and what happens in practice we would be able to effect better change and implementation.

These quotations from two different members of staff at NICE both refer to a perceived "academic ivory tower" environment that is somewhat removed from the environment of at least some physicians such as those involved in primary care.

The ISCM also refers to personal context, including knowledge and experience, as a possible influence on information providers' behaviour. Extract R121 provides an example of this:

- **Extract R121**

Because the people who volunteer to sit on our committees are by definition people who have an active interest in a particular condition, we do tend to get specialists. That includes the GPs, so if we're looking at something cardiovascular we will get a GP who has a special interest in cardiovascular medicine. So there is a bias towards specialization and a bias towards recommending treatments in special settings. Equally there is a lack of understanding of the complexity of managing one condition in an environment where that is one of many conditions – by which I mean general practice. If you get a load of people who are practising cardiologists sitting around talking about a particular cardiology condition, their experience is about doing that probably in a tertiary centre which has all the gadgets and gizmos and lab results and everything available at the touch of a button. They sometimes make unrealistic demands on general practice like: "You should act on a blood result within six hours of taking the blood", whereas you haven't even got it back from the lab by then.

When producing its information and guidance on a particular subject NICE involves experts in that subject area. As this extract makes clear, the personal knowledge and experience of these specialists influence the guidance that they produce, but this may not relate well to the working context of a general practitioner who may not have ready access to specialist equipment or services that are needed.

All these extracts endorse the influence of contextual factors on the behaviour of an information provider, NICE, as suggested by the ISCM. The influence of NICE's goals and their link to its context in the NHS are illustrated in the following extracts.

– **Extract R32**

One of NICE's key roles is to provide the highest possible quality of information to medical practitioners in its very broadest sense. If you look at NICE as a provider of high-quality information, that would cover everything from advice on which drugs should be used, advice on which process to use, advice on when to refer, advice on what quality a service should be designed to meet, a whole range of products ... advice on what's safe and so on. So that simple phrase that NICE uses, which is that we advise the health service on cost and clinical effectiveness – what we actually do is we provide them with very high quality information to help them make decisions.

– **Extract T23**

I'm just trying to think what's on the website now, what our stated aim as an organization is. It's to be the source of credible evidence for the NHS.

These extracts describe NICE's aims of providing information to health care professionals about the management of patients and to be seen as the source of the "highest possible quality" information and "credible evidence". The goal is to influence the behaviour of health care professionals so that they manage patients in the ways that NICE judges to be both effective and cost-effective, as outlined in the next extract:

– **Extract Q22**

The overall aims are to achieve higher standards in health care and to make sure that the NHS is using the most cost-effective treatments. It's also about stopping doing things that are ineffective, and thereby saving the NHS money. It

is all about raising the quality of care. To achieve these aims we issue information because we want people to understand and follow the recommendations.

Thus the information from NICE may be directive in nature – its intention is to direct users in their actions in conformity with NICE's goals and perspective on what is appropriate and cost-effective patient management: "we want people to ... follow the recommendations."

The ISCM shows a close connection between the provider's goals and contextual factors, and this link is illustrated for NICE in the following two extracts:

– **Extract S51**

I must admit in the work I'm doing now I feel like we have a requirement from government to effect change in terms of behavioural change for research-based practice but I'm not sure how we're going to achieve that well unless we are closer to working with people

– **Extract R41**

I think we would describe it as advice from the Secretary of State. Certainly our quality standards are described as advice to the Secretary of State. I think guidance would probably be described as advice to the health service. This terminology gets very messy. Guidance covers just about everything that we produce. Guidelines are one particular part of that – I'm talking about clinical guidelines. That would advise people about the best course of action with a particular patient, but "best" would encompass most cost- and clinically effective course of action. I think that's what we're here for – is to work out what is most cost- and clinically effective and then let that be publicly known so that people can use that information to inform their decision making.

NICE's operating context – its remit from government and the Secretary of State for Health – influence its goals ("to effect change" in clinical practice) and outputs ("advice to the health service"). However, there is recognition within NICE that these goals and outputs do not necessarily accord with the needs and views of physicians:

I think we'd like to think we understand doctors' needs for information and receptive to the feedback we receive and that we actively seek the views of those who use our information. I'm not sure that that approach is always entirely compatible with the task that we've been given. And I think probably our task or the organization task has been more one of having to deliver certain outputs and go as far as is reasonably possible to make sure that they're fit for purpose and used as widely as possible.

These extracts show that contextual factors can influence a provider's goals and information outputs as suggested in the ISCM, and that those outputs may not fully match the different context and needs of the user.

The ISCM refers to the influence of perceptions on information behaviour – they may be the provider's perceptions of itself and the information it provides, of information users or of other providers. The extracts above provide some examples of the perception by NICE staff of the information that it provides as being the "highest possible quality" and "credible evidence" that health care professionals should follow. Similarly:

– **Extract T21**

I think we see ourselves as being the key provider for the health service – but I think particularly for the medical profession – of the evidence base to support better decision-making, and that goes ... I'm talking more from the perspective of clinical guidelines because it's rather different in relation to drugs, in that if they've been appraised positively they come with a funding direction so that's not really about supporting decision-making, that's at a slightly different level.

– **Extract T52**

Well I think there is so much information out there, isn't there, that I think some sort of badge or kite mark is valuable to enable people to distinguish. And I think NICE has actually achieved that credibility over the last ten years. It is seen as being a respected brand and it's looked up to throughout the world for what it does and how it does it.

These comments show perceptions within NICE of its own importance as "the key provider" of information and guidance to health care professionals in the NHS and of the high credibility of the information it provides. However, the user's perceptions – of the provider, the information provided and its credibility and utility – may differ from those of the provider. Extract T31 cited above provides an example, suggesting that some physicians may not perceive NICE in the same way as it perceives itself: "I think we're quite often perceived as doing things in an overly academic ivory tower type of way and what we do isn't necessarily tailored to a more generalist audience."

One of the ways in which NICE develops its perceptions of health care professionals and their needs is by actively seeking their feedback (see also section 5.5.4.2).

– **Extract R15**

Typically the sorts of people we would see would be people with director in their title: chief executives, medical directors, the director of nursing, chief operating officer or whoever is head of the provider services, director of commissioning – those sorts of people. But we have another population of people we see, who are those we colloquially call NICE managers. Those are people in clinical governance, audit functions, whose role it is to facilitate the roll-out of NICE guidance. They will often be the people responsible for opening and reading our newsletter and disseminating guidance to various committees etc.

Perceptions based on discussions with these people may of course be inaccurate as relatively few physicians in the NHS are at the levels of seniority described here.

As is the case with the pharmaceutical industry, goals are important motivating factors leading NICE to produce and communicate information, and in particular the goal of influencing the behaviour of health care professionals:

– **Extract Q22**

... we issue information because we want people to understand and follow the recommendations

At the time of the interviews the development and improvement of the information product NHS Evidence was in progress. Part of the motivation for this was to meet

health care professionals' needs better and thereby to encourage its use and increase its influence:

– **Extract S11**

I have a senior analyst role as well as managing the programme so that it fits strategically with driving the business forward for NHS Evidence. That means that we have two main strands to our work. One is around usability – we want to be and aim to be a user-led service and so my role is to ensure that we involve users in design and development and in an iterative design process. Then we produce products and prototypes that we then test out with users and get more feedback. So eventually, hopefully we're producing a product that has been shaped by them. So that's the usability side. Then the other side of our work is understanding the market insights, market segmentation – understanding our audience really: who are our audience, how is it made up, what are their differing needs.

One of the inhibitory factors preventing NICE from producing information products and communications precisely tailored to meet users' needs is the variety of those needs and by implication limited resources within NICE:

– **Extract R62**

If we were to send all the cardiology stuff to this GP and all the dermatology stuff to that one, and it doesn't cover everything and it's too messy. It's not uniform – it depends on where people's interests lie. If they have a partner who's interested in dermatology and then they leave, the next person could be interested in maternity, so there's no way of ensuring that there's a good spread. So it would be unrealistic.

Another inhibitory factor, which limits NICE's ability to find information about users' needs is its budget:

– **Extract T71**

Well I think that given an unlimited budget we could do more about understanding what their particular needs are. NICE isn't an organization with a huge budget in the first place

As was the case with the pharmaceutical industry interviews, analysis of the interviews with NICE staff supports the validity of the ISCM in that context, goals, perceptions and motivating and inhibiting factors are key influences on an information provider's behaviour.

5.5.2   The information user, context and related factors

The interviews also provided much information about physicians and contextual factors affecting them. The findings accord with those reported in Chapter 4 from the literature on physicians' information behaviour and provide further support for the importance of context in the behaviour of information users as indicated in the ISCM.

5.5.2.1 Pharmaceutical industry interviews

Interviewees referred to the environmental context in which physicians work and the constraints that the NHS environment can place on their information use and decision making.

– **Extract J61**

Interviewee: That's what I've realized from conversations that I've had with various healthcare professionals, that in an ideal world they'd love to adhere completely to NICE guidelines but it's actually difficult practically to do that.

Interviewer: And is that because of the time required to monitor patients, to investigate them?

Interviewee: Yes ... I think monitoring ... having enough resource in terms of enough nurses to help ... budget as well – I mean, budgets are stretched so that's a massive factor as well.

– **Extract G42**

I think they [physicians] would have to make their own judgement based on their understanding of the therapy area, their use of the product and any other constraints that may be put on them from external bodies. So it may be a cash constraint or whatever it is.

– **Extract M42**

I think that the reality is – especially now – is that money within the economy full-stop and certainly in the NHS is the number one decision-making factor.

– **Extract B23**

As we see the NHS evolve and as we see physicians coming under more stringent market access environments at both a regional level and at a much more local and now more strategic consortia level, the question whether a medicine fits in a formulary is now becoming much more important. Their individualistic choice is being taken away and there's a much more homogenized view of which medicine is most appropriate for a patient group

Physicians may not be able to act upon information provided by NICE because of lack of resources or budget needed to implement NICE guidelines (extract J61). Extracts G42 and M42 also refer to budgetary constraints, part of their working environment, affecting their clinical decisions and by implication their need for information to inform those decisions. Another environmental constraint may be a formulary, a restricted list of preferred treatments that may be provided in the NHS (extract B23). A formulary is part of the physicians' working environment and can also be seen as a directive communication from NHS authorities directing health care professionals to use what are regarded as appropriate treatments.

As suggested by the ISCM, a physician's personal context also influences the use or non-use of information and decisions and actions. Physicians' experience with a medicine may act as an inhibiting factor so that they do not seek information on alternative treatments even when they should do so:

– **Extract A22**

You know, doctors often with experience of many years of using older drugs will feel very happy to use a particular drug without the need for more information.

– **Extract L21**

So they have a limited knowledge about a product. Obviously there's doctors that are very knowledgeable about products in their key area, and I think there are some hospital consultants who I've come across in my career who are

extremely knowledgeable. I've worked in transplant for a while and there were some transplant physicians who knew the immunology of all the medications – they were very very knowledgeable. There were others that didn't know that – they just effectively had a very strong perception of how they thought something worked and should be used, but actually that wasn't often backed up by actual data.

Personal experience, the influence of colleagues and emotional factors may affect prescribing decisions in different ways:

− **Extract B22**

if a GP is making a decision about one of two [medicines] they'll make different prescribing decisions based upon the type of patient that sits in front of them that will have exactly the same disease area ... sometimes will present with very similar symptoms. So there's a level of almost logical thinking and that final part is actually much more of an emotional response, and that's around confidence. That's nothing to do with data, that's to do with clinical experience, what your colleagues say and do, and that very final tranche, which is much more about emotional decision than it is a specific information search.

Closely related to context in the ISCM are the user's needs, wants and goals. The interviews with staff from pharmaceutical companies described information needs for which physicians may contact those companies. The need may be for basic information about the dosage of a medicine, its efficacy and side-effects:

− **Extract E26**

They also need to know the dosing regime specifically. I would also say the other two factors would be – if it's a GP drug – I would say they would then need to know any contra-indications and any administration – or, as I say, dosing or administration factors to consider. What that allows them ... on that basis alone it allows them to prescribe.

− **Extract A21**

So it may sound obvious but the main information needs are really an understanding of the efficacy, appropriateness and safety of a medicine and how that fits in with the patient that's sitting in front of them.

- **Extract C32**

The vast majority of clinicians are general practitioners and bluntly they're much more interested in: 'Can I crush the tablets? What do the muscle side-effects look like?' Because that's the level that they practise at, because they practise across a massive breadth of information

Information of a more specialist nature may also be requested – for example about non-approved uses of a medicine, its use in patients who have complications such as kidney or liver disorders, or hospital physicians may want detailed information about how the medicine works and how it is handled in the body (pharmacodynamics and pharmacokinetics).

- **Extract G11**

Information needs are often about unlicensed uses. Other areas are maybe where they've had some sort of an adverse event or a potential adverse event, and again just any further information on anything like that. And the third area tends to be where I guess they just see if we could provide general information about a particular aspect of the treatment and its effects in a particular small component of the disease area – so, I guess something like in all patients with renal disease or liver disease or that sort of area

- **Extract M21**

In secondary care, though, there's a broader profile of the product, but I think that's obviously due to the fact they're specialists. Proper GPs aren't ... you know what I mean ... specialists to that area, so obviously PK/PD [pharmacokinetics/ pharmacodynamics] information, broader scientific information, safety-driven being the primary concern.

Because of budgetary issues and formulary and other restrictions on medicines that may be prescribed in the NHS (which are contextual factors in the ISCM), physicians also seek information on costs of treatments and how to reduce them or even information to make a business case for using a non-preferred medicine.

- **Extract E27**

Probably one thing I would say as well that is becoming more and more

important is: what is the cost impact of this product? So whether it's a primary care drug or whether it's "I'm referring", what is the cost of diagnosing and treating this patient, either with that drug, or what is the cost?

– **Extract C13**

And increasingly what I'm finding is that what clinicians are looking for from pharma is not: 'Tell me why to use your medicine' – it's much more: 'Tell me when not to use it'. So they're much more interested in a conversation which appreciates the use of more generic, cheaper medicines and maintaining the more expensive, newer, innovative medicines for those patients who may have a particular need.

– **Extract C11**

The first need that they have is: 'What is the best treatment for my patient?' And that's a more traditional need, certainly the need that I applied when I was practising, and also quite a few of the questions that we get through Med Info: 'Why is this treatment the best treatment for my patient?' Increasingly, though, with the health policy in the UK, with cost constraints and with the limitation or the control of medicine use, it's much more around: 'Why do I need this medicine for my patient? ... Now if you define the need for a best medicine you also need a business case to argue as to why that is the best medicine if it's not approved for use in that PCT [Primary Care Trust].

Physicians also want factual information in preference to promotional information and there is evidence from the interviews that some companies are seeking to provide information in the way that physicians want it.

– **Extract N11**

They want accurate, balanced information, not promotional information – primary publications, randomized placebo-controlled study standard, the gold standard, as you would expect. The usual grading of what is evidence-based – so basically evidence-based medicine. We know what the gradings are, what's the gold standard. So I think if we asked any of our key opinion leaders, they would rather see a primary published big study that's powered to prove the primary end-point. And robust safety data.

- **Extract A25**

I think there have been realizations – and this is due to the industry and the commercial environment really – that we need to understand what the doctor's needs are a bit better and the different ways they receive information these days.

- **Extract C71**

So it's much more of a seeking relationship to understand what their need is and then to work with them to respond to some of those information requirements. But not every GP wants that. Most hospital doctors they just want the scientific conversation, which is why the MSLs [medical and scientific liaison staff] work well. Hospital pharmacists, they want the economic conversation. Some GPs want the economic conversation because they're actually very interested in commissioning and very interested in their economic frameworks. A lot of GPs, particularly the salaried GPs, that are part-time, the ones who've decided there's actually a life outside medicine – for them it's just a case of: 'Who do I use it in? Who do I not use it in?' and 'How do I use it safely?'

Interviewees also referred to the importance of physicians' perceptions when seeking or using information and a common theme was mistrust of the pharmaceutical industry by physicians and other health care professionals.

- **Extract G51**

But I do think there's an inherent mistrust of anything that's been done by the industry

- **Extract H25**

There are some doctors out there that will not believe anything that any pharma company will tell them

- **Extract L51**

Every pharmaceutical company's the same – we're all full of people that are just doing a good job, but that's never what's portrayed. So I actually think there is some good evidence out there, I still think it's viewed very sceptically unless it been done by the NHS itself.

– **Extract N94**

I have friends that are pharmaceutical advisers and they won't see industry, even if it's somebody from the medical department, they will not see industry. They believe that they cannot get ... that the only way that they can make an appraisal of a trial or a piece of data is to do it themselves or to use things like horizon scanning documents, NICE, the medicines information department up in Northwick Park or the NHS bulletins that they produce.

These perceptions may inhibit health care professionals from seeking information from companies ("they won't see industry") or they may dismiss or ignore information provided by them ("will not believe anything that any pharma company will tell them"). In contrast perceptions of NICE are generally positive – it is seen to be independent and it produces trustworthy, credible information.

– **Extract A91**

I think that the perception probably is that NICE is independent and therefore perhaps the information coming out of NICE is more trustworthy.

– **Extract J83**

NICE is seen as independent ... totally.

– **Extract L92**

I think the average ... your doctor would say that the NICE stuff is more credible than anything that comes from a pharmaceutical company because we're only trying to make money. I don't necessarily believe that. I think we're genuinely trying to ... yes, we are trying to make profits but we're genuinely trying to get the right drug to the right patient.

Some health care professionals do, however, perceive NICE as operating in an "ivory tower" environment, echoing comments of two of the NICE interviewees (extracts S52 and T31), and issuing guidelines of low utility that are difficult to implement or that do not correspond to the "shop-floor" environment of the physician.

This is just from conversations that I've had with healthcare professionals, but a few do view NICE as being very much the ivory tower and the reality on the shop-floor is actually quite different. I've noticed that with some guidelines that NICE produced in my therapy area, which are actually quite difficult to adhere to in reality because – as I mentioned earlier – because of time and resource issues.

Another perception mentioned that influences physicians' behaviour is their perception of the adequacy of their own knowledge and experience. They may believe that they have sufficient knowledge about the treatment of particular illnesses and fail to seek up-to-date information about appropriate treatments:

– **Extract L22**

But they don't all have detailed knowledge: some do but some rely on perceptions rather than on actual knowledge, actual factual data.

Yes. Or it's their own perception: "I've used this in ten patients, therefore ... this is true". And I've come across that several times. And you're bound to be swayed by your own ... you know, if the drug works really well on the first patient you use it in, you're bound to have a different view on something than if it actually didn't work on the first patient you used it on.

This extract and extract A22 cited earlier show that experience and perceived self efficacy can act as inhibiting factors as described in the ISCM resulting in physicians not seeking information. The interviews provided little insight into motivating factors except, by implication, the urgency of the information need. In the following extract the interviewee, a physician, refers back to his experience as a general practitioner and as a hospital doctor. An urgent need for information such as the appropriate pack size to write on a prescription or details of possible interactions between medicines would prompt him to use sources such as MIMS and the British National Formulary (BNF).

– **Extract K12**

Going back to my days as a GP, your needs are different to that from a hospital doctor. So as a GP the most frequent need for information was often more

around pack sizing and dosing because you never wanted to prescribe 28 tablets when it was a 30-tablet pack and vice versa. So as a GP you often consulted MIMS for top-line information around pack size in particular and dosing, not so much for side-effects. Whereas I think in hospital medicine, because the medicines you're using are more complicated, the BNF was your Bible and you were more often looking at potential drug interactions and maybe complicated dosing schedules.

The analysis provides further support for the validity of the ISCM in regard to the influence of the information user's context and related factors on information needs and behaviour. Analysis of the NICE interviews provides additional evidence.

5.5.2.2 NICE interviews

One interviewee, who was a physician, provided insight into an aspect of a physician's personal context affecting information behaviour. Limits to the physician's knowledge result in an information need and use of an information source:

− **Extract T12**

I think it would be unrealistic to say all doctors and certainly all GPs retain in their head all the information from the SPCs for all drugs, if we're talking specifically about drug-based information. I think it depends very much on what you're encountering. Some things are relatively straightforward and some things as a doctor you feel reasonably comfortable with, and others ... it's obviously very important to recognize your boundaries and where you do need to look for further information. I always had a BNF at my side.

The effect of environmental context was also mentioned:

− **Extract S13**

We know that in certain settings access is more difficult. So FYs (foundation year physicians) and more junior doctors, more junior registrars may be sharing computers in a hospital site and that connection can be really slow. That's very different obviously to a GP sitting in their office with faster access and a sole PC.

As well as perhaps driving the topics that they're interested in, it's about that practical access issue.

The facilities available in the working environment can have a direct impact on information behaviour. In this extract the relatively poor access of junior hospital physicians to computers and poor network connections may make it difficult for them to seek information. In contrast, general practitioners have their own computers with good network connections.

Time pressures are another aspect of the working environment that may affect information seeking:

– **Extract S81**

I hope that Release 4 for NHS Evidence reflects the level of user engagement there has been with medics and starts to deliver what it is that they need and in a way that is just more accessible to them – because they're so time-pressured. That's the other thing – you don't want to be spending hours trying to find your way round someone's website

The following extract describes the influence of work role.

– **Extract S12**

We used to think that it was really important understanding the person's role and that was the key influence on their, say, search behaviour. Actually, what has become apparent from the work we've done so far is that setting is almost a bigger driver than the actual role. So, for example, a more junior doctor, for example, an FY (foundation year physician) who's in a general practice setting will have more in common with general practitioners who are more senior to them than they will with FYs who are working in a secondary care, in a hospital setting. So it tends to be that setting comes above what their actual role is, the level that they're at. We've found this particularly with nurses – a junior nurse has more in common with a specialist nurse and senior nurse in that setting than they do with a counterpart in a different setting.

This interviewee used the term "role" to distinguish between a junior physician still in training and a more senior, fully qualified physician working as a general practitioner

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or in a hospital. The nature of the job or the "setting" appears to have a key influence on information behaviour. Thus a junior doctor training in general practice will have information needs similar to those of trained general practitioners but different from those of other junior physicians who are training in secondary care in hospitals.

The NICE interviewees also provided perspectives on physicians' information needs, which often concern decisions about patient treatment:

– **Extract T11**

I guess ideally the information need would be around supporting decision-making to make better quality clinical decisions. That would incorporate comparing the safety, efficacy and suitability for the patient given their clinical presentation.

Needs may vary depending on physicians' expertise and experience:

– **Extract P11**

If a doctor is an expert in a particular field and senior in that field, such as a consultant gastroenterologist, he or she won't need us to advise on the use of monoclonal antibodies in the treatment of inflammatory bowel disease. A junior doctor, perhaps just starting his rotation in cardiology, might need some guidance from us on the management of heart failure. A general practitioner will be familiar with the management of common conditions but not the lesser known ones. So there's a diversity of needs.

Physicians want information to be easily accessible:

– **Extract R72**

Really what they want is absolutely all the information that they need at the right time but in the simplest possible way.

As well as wanting information in an accessible form, some physicians want educational information to help them increase their knowledge:

- **Extract Q23**

For example different doctors and groups want to access things in different ways. Some people prefer hard copies and they want them in front of them on their desks. Other people want to access the material online and others want a more educational forum.

These extracts echo the findings from the analysis of the literature reported in Chapter 4 and further endorse the ISCM's concepts of context-related information needs and the utility (accessibility) of information. The influence of perceptions was also mentioned, one interviewee commenting on physicians' perceptions of NICE:

- **Extract T22**

I think it's probably fair to say that different doctors – and I'm not sure what the characteristics of those doctors would be – have differing feelings about NICE and the information that NICE generates and their ability to use it and incorporate it. But I think most doctors think that in general the information that NICE produces is a good thing.

This extract is similar to comments made by pharmaceutical company staff (extracts A91, J83 and L92 above).

One interviewee referred to educational needs and clinical decisions as motivating factors for seeking information:

- **Extract S32**

For younger doctors obviously there's quite a big driver around education and learning, and for doctors who are more experienced – perhaps not so much at consultant level – around CPD and the CPD function that NHS Evidence can support them with. We've had that reflected also with nurses and AHPs – that there is a big usage driver of NHS Evidence users. There's two main reasons they come to NHS Evidence and it's pretty evenly split – the percentages are very close, about 1% between them – the first is CPD and education and the second is to inform a care decision.

The analyses of the interviews of staff in both pharmaceutical companies and NICE add to the literature analysis in Chapter 4 and support the influence of contextual and related factors on users' information behaviour as described by the ISCM.

5.5.3 Information sources, information products

The interviews asked about information and information products produced by pharmaceutical companies and NICE and about the sources used by physicians.

5.5.3.1 Pharmaceutical industry interviews

Companies produce a range of advertising and promotional material such as advertisements in journals and "sales pieces" used by representatives. In addition they provide factual information through medical information services and non-promotional websites. Increasingly companies use "medical science liaison" staff who visit health care professionals to provide information that they have requested. The following extracts provide examples.

- **Extract M23**

  Interviewer: How does the company try to meet doctors' information needs?

  Interviewee: Well, from a promotional perspective often it's probably the classic glossy sales piece. I don't think we necessarily do that very well. What we do have from a payer perspective and health economics perspective is we produce health improvement models, budget impact models for doctors

- **Extract C21**

  I regard the sales team as probably the first source of information – over and above their selling role they also have a very important role to impart information.

- **Extract L31**

  We have medical information, which is the standard service that most people provide. We have a field force, which provides, obviously, selling information. We have a medical liaison force, which goes out and speaks to customers on a more broad-based nature where they're interested ... We have a lot of

promotional literature out there, publications, we produce formulary packs with key papers – all that standard stuff that most pharmaceutical companies do. We have various web-based ... so some products will have their own website. You've got the [company] website that people can look at to see information on products. Obviously we've got links to eMC [the electronic Medicines Compendium], or the SmPCs [summaries of product characteristics] are on eMC.

– **Extract J23**

We have the medical information service, which is a service in which any sort of healthcare professional or a member of the public could ring in with an enquiry and appropriate information is provided that is obviously evidence-based and factually correct. So that's one route. That's the medical information team, but we also have field-based scientific advisers that can also provide key information but on a more face-to-face level. So again if there are questions or requests for presentations then that team are able to meet those needs out in the field.

– **Extract K22**

We provide various dedicated websites – so we have product-specific websites, some of which are in development. We've got a lot of disease awareness websites which are not medicine-specific but raise people's awareness and then the hope is that these patients if interested will contact the healthcare professional or contact a charity or a helpline and ask for positive information.

Interviewees referred to a variety of sources that physicians use, similar to those reported in the literature reviewed in Chapter 4. They include colleagues, databases such as PubMed, the Internet, NICE, NHS information services such as UK Medicines Information (UKMi: http://www.ukmi.nhs.uk/), academic groups and conferences:

– **Extract A51**

One appropriate place is from their peers, and from academics within the field. From charities and other academic groups – I'm thinking of Cancer Research, that sort of thing ... From the regulatory and health authorities. I think those cover the main areas.

- **Extract D42**

They can do their own research. So they can look into PubMed or look up a product's SPC on the eMC or something like that. And another place I guess would be something like journal clubs or the like in hospitals, which should be untouched by any arm of the pharma industry. So somebody comes across something about a new product and sends it back to their colleagues, and reading journals and that kind of thing, specialist publications, and NICE publications if they exist in your disease area

- **Extract G33**

In the UK there's certainly networks like the UKMi that they can get information from. They can also get them I guess from community pharmacists or hospital pharmacists depending on where they work and where they're trying to get the information from. And I guess nowadays there are various other sources that the NHS provide for information. I think the ideal source for the most accurate information about a company's products really is within the scientific service of the company still though, because there's no interpretations made there.

- **Extract J51**

Well I guess pharmacists are one source, regulatory bodies, NICE being I guess the main one, but also there are guidelines published by national organizations – I mean in my example in rheumatology the BSR, the British Society of Rheumatology, has published a number of guidelines over recent years highlighting how certain products should be used, and that's another source. What else? There may be local or regional groups that meet and decide in a territory how a product is going to be used. Key opinion leaders as well both at a national and international, particularly at regional ... at large conferences can help provide information based on their experience ... Oh, and I should mention also the Internet, and I know that there are various websites that are set up to provide information: patients.co.uk being one that comes to mind I know a lot of GPs tend to use.

5.5.3.2 NICE interviews

NICE produces a variety of information and information products. Such products include:

- technology appraisals of new and existing medicines and treatments for use in the NHS in England and Wales
- clinical guidelines and pathways for the assessment and treatment of diseases
- public health guidance
- NHS Evidence, "a service that enables access to authoritative clinical and non-clinical evidence and best practice through a web-based portal" (https://www.evidence.nhs.uk/about-us).

Interviewees referred to these products as providing guidance that physicians should follow:

– **Extract P12**

There are two major outputs we produce that include reference to medicines. Clinical guidelines put them in order in a hierarchy of medical treatments. Technology appraisals simply say this stuff works and it's not too expensive and you can use it in these circumstances.

– **Extract P21**

The NICE guideline would typically be between 25 and 65 pages long and gives the recommendations and some background. Then there is the quick reference guide, typically between 4 and 16 pages long. This presents recommendations in a logical sequence appropriate to the management of patients and could be in the form of a flow-chart or algorithm, or in boxes with statements such as "In this circumstance this is the way you manage your patient".

– **Extract R33**

They're constrained by some of it in that they must follow our advice, but a lot of the time it is simply ... we call it NICE guidance, it's not NICE instructions.

As noted earlier (section 5.5.1.2) information from NICE may be directive in nature, directing or at least guiding physicians in accordance with NICE's goals and

perceptions on appropriate patient management. This again illustrates the link, shown in the ISCM, between the provider's goals and the information it disseminates.

When referring to other sources of information that physicians do or should use, interviewees referred to sources similar to those mentioned in the pharmaceutical industry interviews and those reported in the literature reviewed in Chapter 4. They included official publications such as the British National Formulary, the electronic Medicines Compendium, medical royal colleges, bibliographic databases, books and journals. Professional colleagues were also mentioned.

- **Extract P25**

    For information about medicines I would expect them to use the British National Formulary and the electronic Medicines Compendium. I would hope they would use NHS Evidence, the online portal provided to search out the best evidence. Then they might use more specialist sources. If they have used the three mentioned so far, I would expect them to use a drug information service.

- **Extract S33**

    With consultants they told us that their main web searches very often use royal colleges and Google, which is actually quite similar for registrars and specialist doctors and for GPs. But where the difference comes is consultants spend a lot of time looking in bibliographic databases such as Medline and PubMed and the like. Registrars and specialist doctors and GPs – they're more likely to be looking for guidelines and they give us examples of NICE guidelines or clinical knowledge summaries.

- **Extract T42**

    Well, I think if they're complex decisions they're quite likely to go to the literature, aren't they? If they're reasonably straightforward, probably a lot of it is accumulated knowledge that they carry with them.

- **Extract S83**

    ... they talk to each other a lot. Peer to peer communication and information sharing is quite high in the doctors' groups, particularly the foundation year

doctors we've worked with are prolifically asking their senior colleagues about medicines information

When specifically asked about the pharmaceutical industry as a source interviewees expressed the view that information from companies may be biased and of low credibility (see section 5.5.6.2). By implication the official publications and other sources mentioned were regarded as more credible.

5.5.4 Information seeking

The ISCM shows information seeking as an activity of an information user, but in order to produce information products and communications a provider may need to find information. In doing so the provider plays the role of user in the model.

5.5.4.1 Pharmaceutical industry interviews

Apart from data from the clinical trials that they sponsor, pharmaceutical companies often need to find information from the published medical and scientific literature. They may use their own product-related databases or external sources such as electronic publications and medical databases. Information specialists such as those in medical information departments are often involved:

– **Extract C84**

We've got big electronic libraries ... I can see journals but I'm not necessarily actually finding articles, so I'd probably go to something like Ovid, one of the search engines, one of the medical literature search engines that we've got access to. I can do a keyword search. But at this stage I'd probably go to my Med Info colleagues because I'm not very good at working keyword searches.

Companies also research physicians' needs and their views of advertising materials through market research. They may also seek advice from them about clinical research or about marketing their medicines through advisory boards. In this way the roles are reversed: the pharmaceutical company is the information seeker and the physician is the provider.

– **Extract B53**

What we traditionally do is go out to groups of customers, whether it's advisory boards, whether it's through quantitative or qualitative market research techniques, in order to understand unmet needs, understand what information is most relevant.

– **Extract E62**

We would commission market research to go away and independently come back then with responses: "What do our customers think to this information on this sales aid", for example, or "We're launching this new product. What is the ... what are the key messages that resonate?" And also, when a product's being promoted we often ask on a regular basis our physicians through a formal market research process: "Which messages resonate? What do they mean to you? Are they meaningful? Do you make use of that? Are there any questions? How has it changed your behaviour? How has it changed your thought processes in your prescribing?"

– **Extract N31**

But we listen to physicians. We do our interactions with physicians, whether that's in a clinical trials setting, at an advisory board, at a one-to-one discussion, we constantly ask, "Are we meeting your needs? Is this sufficient? Is this the data you want?" And I think that that is an ongoing cycle where we are asking and getting feedback.

5.5.4.2 NICE interviews

To produce its guidelines and other information NICE needs to collect evidence about medicines and other health care interventions. One interviewee referred to the thoroughness of information seeking by NICE when doing this:

– **Extract P43**

The search strategies used to gather evidence are thorough. If relevant information has been published it will be found.

Other interviews revealed the ways in which NICE seeks information about health care professionals and their needs:

– **Extract R12**

We have a fairly strategic way of planning who we'll go to see based on what's going on in the environment in the health service, in NICE and politically, and depending on whether we've seen people recently or not. We'll sit down and in a systematic and structured way we'll have that conversation twice a year and identify groups of people to go to visit. Then we'll have a framework for that visit, a list of areas that we want to address in that meeting. We won't use it by starting at number 1 and working through to number 20 – we'll have a discussion with them and aim to cover some key areas.

– **Extract R43**

We (the field team) function entirely on individual conversations and anecdote and qualitative feedback. Basically we just go out and talk to people and listen to what they say. We've got a number of pieces of information that tell us what GPs want. One is engaging with academics who have researched the field of how GPs take decisions, how they process information and so on. So we have looked at the research database. In addition the field team conducted about 40 visits to general practice a couple of years ago and we just talked to GPs – we tried to get to GPs, practice nurses and practice managers, and we got various combinations of those people.

– **Extract S82**

I think the service [NHS Evidence] launched very quickly but the user research team was only employed 6 to 12 months after launch. Normally for business development and that kind of research you would employ them 6 months to 12 months before you launch your service or business, so we've been playing catch-up....

These comments suggest that NICE's approach to finding information about its users may have been less systematic than that for finding evidence about health care interventions (compare extracts P43 and S82).

One interviewee also spoke about information seeking by physicians:

–   **Extract S34**

51% say they only obtain it [information] themselves and never ask somebody else and 40% say they mostly obtain it themselves. Then only about 6% say it's half and half – half the time they look themselves, half the time they ask somebody else. Nurses and doctors are actually more likely to look for the information themselves, managers and commissioners are more likely to use a third party.

–   **Extract S61**

We thought that more of the younger doctors, particularly the doctors in training, would show a higher propensity to seek information during consultations with patients, but the feedback that we've had from them is that they don't like to do that because they feel it undermines them in front of the patient and it makes the patient nervous. Also they don't want to be seen by their consultant not to know what they're doing so they try and go and look up what they need to look up afterwards. They feel less worried about doing it with drug information than they do about other kinds.

Extract S61 provides an example of the feelings an information user may have when seeking information, as depicted in the ISCM. In this case younger physicians are hesitant to seek information in front of patients because they feel it undermines the patients' confidence in them. They also feel worried that more senior physicians will doubt their competence.

5.5.5   Communication, process and medium

Interviewees talked about communication from their organizations to physicians and also two-way communication.

5.5.5.1 Pharmaceutical industry interviews

A major form of communication by pharmaceutical companies to health care professionals is to advertise and promote their medicines. Traditionally this has

been through a "push" approach, proactively communicating promotional "messages" through advertisements, visits by representatives and in other ways:

– **Extract A23**

The traditional model has always been to somehow push information on our newer products or our marketed products to doctors in some form or the other, whether that's traditionally through the sales rep route, whether it's through leave-piece and information documents or any other ... through congresses, symposia, that kind of thing. The traditional model is still around and that's still used and that's very much the sort of push marketing strategy. So the idea being to get the information that a doctor needs, which is efficacy, appropriateness and safety information – to take it right to the doctor so that they can then use it in their practice.

– **Extract M43**

There's a core advertising approach to brands, journal ads, sales aids – the usual sort of stuff – mailings. But also within the structure we have as I say, market access roles, field-based medical roles, so we are able ... I guess we try and broad brush the majority but then provide more sophisticated scientific information to the people within the higher decision-making roles.

Reactive communication, responding to enquiries from physicians, is also common, particularly by medical information departments which have responsibility for providing factual scientific and medical information that health care professionals request. Such communication is also now frequently carried out by medical/scientific liaison staff who visit health care professionals:

– **Extract J23**

We have the medical information service, which is a service in which any sort of healthcare professional or a member of the public could ring in with an enquiry and appropriate information is provided that is obviously evidence-based and factually correct. So that's one route. That's the medical information team, but we also have field-based scientific advisers that can also provide key information but on a more face-to-face level. So again if there are questions or requests for presentations then that team are able to meet those needs out in the field.

– **Extract N21**

We have a medical information department which responds directly to enquiries. So that would be based on the whole resource that we've got available on that product, and that obviously is non-promotional. That's very much a reactive service and I think that the way that we provide it in other respects, particularly in relation to the clinical use of the drug is through these non-promotional medical, field-based medical personnel that are doctors, pharmacists, nurses or scientists by background. They don't use any material that does spin, it's not promotional material – it is not slides sets that have been manufactured, that have gone through any approval process. They use the original papers, the original data, and they provide that in a way that is completely balanced. So there is not a situation where we just cherry-pick certain aspects of safety data – the whole data set is presented.

The distinction between promotional and non-promotional information noted in extract N21 was also made by many other interviewees. The following extracts provide a representative sample of comments.

– **Extract A42**

Promotion of medicines is where your primary intent is to change the prescribing behaviour of a healthcare professional.

– **Extract B64**

Promotion is very much around activities which are there to increase the supply or the demand of a particular product. So it's very much around activities which generate demand or generate sales directly. Whereas non-promotional activities are very different – they're much more about raising the education, raising the capability and are very explicitly not product-focused.

– **Extract G32**

Clearly advertising and promotion are activities that are done by the commercial team and for the purposes of selling the product, but also they can be vehicles for providing information as well. It's just as scientifically rigorous and things are clearly signed off to comply with the codes and all the regulatory requirements. So in a real sense there shouldn't be a great difference between advertising and

promotion that's done from a pharmaceutical company basis and evidence and information that you might provide.

− **Extract J43**

I think there is a distinction between the promotional aspect and the information-providing aspect. I mean, there's some cross-over as well but the function of the scientific/medical information department that are directly providing information ... would not be deemed promotional in nature in the way that it's provided and the nature of the information that's provided. Whereas information that's deemed promotional still needs to be accurate in terms of the evidence that's provided, but I guess some of the wording that's used may be presented in a slightly different way and you can say the same thing in a number of different ways.

These comments note the commercial goal of advertising, "to change the prescribing behaviour of a healthcare professional", but also reflect the perception of company staff that promotional information is accurate and "scientifically rigorous". This differs from the perception by NICE and physicians about promotional material, who perceive it as biased and of low credibility (see section 5.5.2.1 above and 5.5.6.2 below). Because of these negative perceptions, and also because of the rapid development of information and communication technology, many companies recognize that they need to change the way in which they communicate (see also section 5.5.1.1). This may be through two-way dialogue with physicians and understanding their needs better, and by use of appropriate communication media:

− **Extract B33**

What we're now trying to do is have much more of a two-way account management dialogue. So information exchange which creates a bespoke or a co-created solution for a particular locality.

− **Extract M82**

[To improve communication] I think perhaps a better understanding of the day-to-day needs of customers. For want of a better term – I was going to say sympathetic – but probably a more empathetic view of the financial constraints of the NHS. And that probably stems all the way to the top of the companies when targets are set, because everything impacts down.

– **Extract J83**

Bringing in things like social media, Internet and all the new things that are happening, which are fairly ... relatively newer sources of information. That's one route and I think, certainly where I work, it's become more of ... much more customer focused over recent years. So really trying to seek more ... as much feedback as we can to ensure that things are ... projects are more targeted to the needs ... particularly as the NHS is changing big time from a structural perspective and it's important to keep up to speed with that.

Some companies talk of making available as much information as possible about their medicines whether favourable or unfavourable:

– **Extract B44**

If we want to be a trusted source of information you have to walk the talk, and that also means sharing information which may historically not have been very palatable, but actually it's important because that information is critical for a healthcare professional to make a decision that's appropriate. And that also means when a patient has been identified, proactively saying that actually that patient is not appropriate for this medicine for whatever reason

– **Extract B102**

If the trial is conducted, that trial will be conducted to completion and the results of that trial will be hosted on the clinical trials register, which is open to any healthcare professional, and that again is online. I think this is all part of: do companies not publish data which they do not feel is complimentary of their medicine or their current messaging? Well actually we will publish everything, whether it is good or not, and we will make sure that when we are promoting our medicines we have a very clear, fair and balanced way of communicating everything that's out there.

– **Extract N82**

My opinion is that there should be much more focus on providing all the data, having discussions, scientific exchange rather than the case of somebody coming along and providing a leave-piece or a presentation that says that I'm here to sell.

From these comments it can be seen that communications by pharmaceutical companies are evolving, in part to reflect the needs of physicians and other health care professionals, but a major goal remains to promote the sales of their medicines. The distinction between this communication goal and that of NICE was captured by one interviewee in the following words:

– **Extract D51**

You've got competing views, competing communication styles, neither of which in my view is ideal. One [industry] says, "This product's brilliant" but doesn't mention the price, and the other [NICE] says it's too expensive for what it does, and then just communicates that it's been rejected. So I think both sides have issues in their communication style

5.5.5.2 NICE interviews

NICE communicates with physicians and other health care professionals to fulfil its goal of encouraging them to follow its clinical guidance. It communicates in a number of ways. Guidance documents are posted to physicians:

– **Extract R53**

At the moment general practice receive our guidance in a big paper packet that thuds through the door of every single GP in the country. Not every practice – every practitioner in the country gets a copy with a paper newsletter called "Update for Primary Care", which hitherto has not been tailored to primary care at all. It just says "This month NICE has produced this guidance and you need to read all of it." It is very formulaic. What we are gradually doing is changing the content of that so that it's more narrative, more newsy and more selective.

Guidance and other information is also made available on the NICE website (http://www.nice.org.uk/). The NHS Evidence website (http://www.evidence.nhs.uk/) has been developed in part to improve communication and access to information:

– **Extract S53**

I think that NHS Evidence is a recognition that all this information and resources and evidence needs to be more easily accessible and in one place.

As described in section 5.5.4.2 NICE, like the pharmaceutical industry, engages in two-way communication with health care professionals to find out more about their needs:

- **Extract S71**

  NICE do strive to engage doctors in the actual process that exists before that guidance is produced. It seems to me anyway from what I've observed here that the guidance development groups do seek to engage as many doctors as they can in generating topics and in looking at topics of what needs to be ... what needs guidance, what guidance shall we do next and driving the choice of topics ... I think the implementation team are much better at that than other areas of NICE because that's obviously their job, to be out there in the world making those connections, understanding what it is that doctors want from us and how we can better support them in implementation of something.

Like the pharmaceutical industry, NICE recognizes that "push" communication is inadequate and so it is making efforts to understand health care professionals' needs better:

- **Extract R131**

  I think we have to make a huge step forward in the way we communicate and we are in the process of doing this, and that is in changing from a push model to a pull model. So all of NICE's communications up until quite recently have been about: "We do this and you need to know about it", instead of: "What is your problem? We can offer you a solution." I don't think we understand enough about who our different audiences are, although we are really beginning to. We're doing a lot of work on defining those audiences, understanding who they are, what they need and how what we offer will help them to meet those needs. We're turning round that corner now, but we badly need to. I don't think we communicate to people at all at the moment – I think we communicate at them.

Two-way communication may also be used to increase users' awareness of the activities of NICE:

– **Extract R11**

We provide a two-way channel of communication. Partly it's about bringing update messages from NICE to make sure that people are aware of what we're doing, so we are a channel of communication in that way. We also seek to understand how people use our guidance and what they do to put it into practice, not from an inspectorial point of view but so that we can bring that information back into NICE, so that NICE can respond to the barriers and problems that people explain to us that they're finding

There is also two-way communication instigated by health care professionals asking NICE about guidance it has issued:

– **Extract Q21**

We get a lot of cases where a doctor says, "We're interpreting the guidance in different ways – we've been having a local discussion about it and we think it could mean X or it could mean Y, and we want to make sure we're doing it right. Can you tell us which interpretation is correct?" We provide extra information and say "Yes, you've interpreted correctly" or "No, you haven't" or "You shouldn't be doing that – it's outside our recommendations." It's more personalized information.

Interviewees talked about the apparent effectiveness of pharmaceutical companies' communications, either directly from the companies themselves or through third parties acting on their behalf:

– **Extract R132**

... they're [pharmaceutical companies] jolly good at communicating with doctors. If I were them I probably wouldn't change very much about it. If I was taking a policy decision on what we would allow to happen I might recommend some changes which would make it a bit fairer and a bit less glamorous.

– **Extract Q61**

For example, we know that what can happen is that they will, behind the scenes, stir up a lobby group and they don't mind the lobby group saying "We can find two or three people who can say that this is a wonder drug". They'll push that.

Extract Q61 is an example of communication between information providers, one or more of whom then communicates to users. This is represented in the ISCM by arrow ⑤ in Figure 28.

5.5.6 Credibility and utility

The ISCM focuses on credibility and utility as two of the primary criteria used when assessing and processing information. Chapter 4 reported findings from the published literature demonstrating their role in physicians' choice and use of information and sources. The importance to physicians of the credibility of a source has been reported in several studies including that of Tan *et al.* (2006): "The reputation or the credibility of the source is also important. Many expressed caution about information from pharmaceutical company sponsored or related websites. Clinicians are more likely to trust content from independent sources such as cancer organizations, universities and hospitals." However, despite possible concerns about credibility, physicians often obtain information from pharmaceutical companies' representatives (McGettigan *et al.*, 2001) because of its easy accessibility (high utility) – representatives bring it to the physician and it is presented in summary form.

Aspects of credibility and utility were frequently mentioned in the interviews with pharmaceutical companies and with NICE staff. A number of pharmaceutical company interviewees referred to the perception among some health care professionals that information from the industry is of doubtful credibility whereas that from NICE is more trustworthy (section 5.5.2.1, pages 165-166 above). NICE interviewees also referred to the high credibility of the information it produces but both they and industry interviewees suggested that its utility is sometimes low, not being easily accessible or readable and not being relevant to particular physicians' needs and working environments; two NICE interviewees said that it was perceived as operating in an "ivory tower" (section 5.5.1.2, extracts S52 and T31, pages 152-153 above).

In this section further extracts are quoted to illustrate the criteria used to judge credibility, how companies and NICE perceive their own and each other's credibility and some of the factors affecting utility.

5.5.6.1 Pharmaceutical industry interviews

When discussing what makes information about medicines credible, the interviewees referred to using findings from well-designed clinical trials, accuracy, fairness, balance, being up to date and being open about negative findings.

– **Extract N62**

It kind of goes back down to this: large numbers, clinical trials, the design – placebo-controlled, randomized study, large patient numbers, peer-reviewed journal, publication, that all the primary end-points ... primary and secondary end-points ... are presented in the literature. There's no hiding of certain primary end-points.

– **Extract K81**

Interviewer: What else makes information from the industry credible do you think?

Interviewee: I think accuracy, being up to date, not picking the one supporting reference that you've found that suggests recurrence rates of 50 per cent in the particular ... if every other paper says it's 25 per cent. So it's the balance and the accuracy and the up-to-date ... and not quoting references from 1987 if actually there's one from 2011 and 12. And one of the problems of websites is keeping them up to date

– **Extract A61**

I think if you present information in a balanced way, then people will naturally trust that information. If in any way you make it look like you're trying to hide the bad points and promote the good points, then I suspect people will be suspicious of that information.

– **Extract B93**

If I'm building a source of information which I want customers to feel genuinely ... which they felt is trustworthy and credible etc, I think the first point I would look at is any information that's on there has to be fair and balanced and that's warts and all. So we need to be really clear as to what the data is telling us, what the clinical evidence, the evidence base is telling us and the interpretation of that

evidence base by multiple other credible sources which we know are important sources of information for GPs such as Cochrane, NICE – for pharmacists it would probably be the National Prescribing Centre – maybe some national or international guidelines.

One interviewee commented that physicians' perceptions of credibility may vary depending on the person within the company who provides the information. They may give more credence to information provided by a non-commercial part of the company, such as a pharmacist or physician in the medical affairs department, than information from sales representatives:

− **Extract N81**

Interviewer: Do you think that doctors and other healthcare professionals regard information from pharmaceutical companies as having high credibility?

Interviewee: I think it depends on who's delivering it and the purpose of it. I think if it's come from a pharmacist, medic that sits in a non-commercial function and it is perhaps in response ... they've asked for data or they've asked for a discussion, then I think that is viewed in a more credible setting, whereas I think if it's information that's provided by a sales force, then I think it is less credible.

Interviewees were of the opinion that information provided by their companies is trustworthy whether it is promotional or non-promotional. Promotional information is reviewed to ensure that it complies with the requirements of the ABPI Code of Practice and so they consider it to be credible.

− **Extract A82**

The pharmaceutical industry is highly regulated in what it can and can't say and therefore, in my opinion, the information is highly credible.

− **Extract E102**

So I can truly say every one item that I put out into the market, as a marketing manager, should feel credible to that individual because we have a rigorous approval process to go through.

– **Extract H51**

Our medical ... everything that we put together goes through a really stringent approval process. And one of the key underlying principles is that there's fair balance. So we have to put like a disclaimer about the different side-effects and that sort of thing about our product when we're talking about how effective the product is as well. So any of our promotional material does have that fair balance element in it. I think that should help the doctors feel that we are being balanced, but they're obviously going to say we're looking at it from our perspective, which we are.

– **Extract K28**

Interviewer: So what are your company's aims in providing information for doctors?

Interviewee: I think the same aims as any company, which is to be accurate, balanced, fair, objective, and point out the pros and the cons and make sure that patients are getting the right medicine at the right dose. I mean ultimately it does not benefit [the company] – in fact it's to their detriment – if patients suffer adverse events on our medicines. So from not only ... hopefully from primarily an ethical standpoint but also from a business standpoint we want to enjoy a good reputation amongst healthcare professionals and patients. And therefore it's really important that the old cliché, the right medicine to the right patient at the right time in the right dose actually happens.

However, as reported in sections 5.5.1.1 and 5.5.2.1, companies are aware that some of those outside the industry regard them with suspicion and a number are changing their approach to communication (e.g., extracts B31 and D102 in section 5.5.1.1, pages 149-150). Interviewees agreed that information from their companies focuses largely on their medicines and may therefore be seen as being biased.

– **Extract C112**

So public looking at pharma will not trust pharma documentation, pharma information – unless they've had an experience, a good experience with us – because from their perspective we've got an axe to grind and our axe to grind is to sell. So all of our information must be biased because all we're putting out is positive information to sell our medicines. So does that make us any less

credible? No, I don't think it does – it just means that we've got to be aware of that's how people will see the information we produce.

- **Extract G54**

I think at the end of the day industry does studies in areas that will ideally show that their products are effective and safe. So it may well be that the range of data that's available is limited – the bias is in that rather than a bias in the particular study or that there's some cheating going on.

- **Extract H62**

We have to look for places where our products fit in, and we're looking at it from a positive side, from [a company] point of view ... There is a fair balance element and we put the side-effects in. But I do think that everyone ... we all look at it through our light, so it will potentially come across as biased. But it's not meant to be.

- **Extract N72**

Interviewer: Does it [promotional information] have any particular bias?

Interviewee: Well the marketeers will decide on a campaign and they will want to promote a certain aspect of the drug – maybe it's around side-effects. So there's obviously a degree of bias in terms of they're providing a sales aid because they want to sell on an aspect, an attribute of the drug but the data that they use to support that must be robust data, and the claim that they're using about that tolerability must be factual and must true, it must be factual.

Several interviewees commented that information from NICE is perceived to be credible.

- **Extract A53**

Certainly a lot of the NICE guidelines have a very high, a very good reputation – I don't know if that's the right word – they're valued highly within the medical profession certainly.

- **Extract B121**

I think NICE is seen as a relatively unbiased organization. I think there's confidence in their technical ability to digest huge amounts of information and more importantly come up with recommendations on that information, which should be followed and implemented in England and Wales. One of the reasons why there is real confidence ... is NICE is a public body, it has open accounts, there is ultimately accountability to the government and as such it needs to be open and transparent in that sense. It's also the data sources they look at tend to be ... they tend to cast their net very wide

- **Extract H64**

I think NICE would be seen as the gold standard and therefore they would be completely unbiased, it's not coming from a certain product perspective, it's coming from a group of professionals. So I think that would be given more credibility.

Others queried the credibility of NICE guidance, questioning the analyses and assumptions used in producing it, the knowledge of some of the advisers involved or how up to date it is.

- **Extract A63**

They spend a lot of their time talking about cost-efficacy, which uses modelling techniques and they use various statistical methods such as Bayesian modelling statistical techniques. Those sorts of techniques rely heavily on assumptions and so it's very difficult to validate a lot of their models as being scientifically and statistically robust because so much of what they do relies on various assumptions and clinical opinion or I guess expert opinion.

- **Extract L72**

I find it quite bizarre that a team at NICE could sit down without a specialist for the area being considered on the panel ... transplant was a very good example where there was not a transplant specialist on the panel, and the transplant community effectively ... threw out the first NICE guidance and said, "This is completely impractical, you haven't understood what's going on here. You don't

understand that medication is tailored for each individual patient. You can't have a standard response." It was thrown out and everybody ignored it.

- **Extract K91**

The trouble with NICE is it's out of date. It takes them eighteen months to produce a health technology appraisal and by the time they've done that, new studies have come along, which invalidates, for me in many cases, the decisions that they come to.

- **Extract N91**

The feedback that I get from doctors about NICE is variable and sometimes the information isn't quick enough, it's not updated quick enough, and the time period that they take to review certain data – say it's a treatment guideline and they're producing a treatment guideline on, I don't know – the treatment of lung cancer, then by the time that that gets published it's probably out of date, so I think their processes are slow.

One interviewee expressed the view that information from both the pharmaceutical industry and NICE is biased because both produce information to meet their own goals:

- **Extract C91**

Interviewer: How do you view information provided to doctors by NICE, compared with that provided by the pharmaceutical industry?

Interviewee: Equally biased.

Interviewer: Why do you say that?

Interviewee: Because both are offering documentation from their perspective to achieve their goal and you just can't escape that. Anyone who's offering a document is offering it to tell a story and you have to read it from the point of view of the person who's offering the document to really understand the intent behind it. As I say, I like the NICE documentation, primarily because it's usually pretty broad and it's usually pretty thorough as well. I like NICE documentation because it's probably closer to what other people think. Anything from a pharmaceutical company, it has been written for our purpose. That doesn't mean it's bad, that doesn't mean it's wrong or incorrect or invalid – it just means it's

written from our perspective. My argument is NICE's documentation is written from the perspective of proving it to not be cost-effective.

Another commented that NICE is not independent as it operates to an agenda set by the Department of Health:

− **Extract A101**

NICE isn't truly independent, it's an instrument of the Department of Health and therefore has a certain agenda. The cases they pick are based on cases that are signed off by the Minister for Health. So NICE isn't an independent body creating guidance and information – NICE is an instrument of the Department of Health creating guidance on its own agenda.

Some suggested that health care professionals may not implement NICE guidance because of the volume produced, or confusing communications, or lack of time or resources. Thus although the credibility may be high, the utility may be low.

− **Extract B83**

The number of guidelines that are produced by NICE is approximately 230 a year, so it's a huge volume, a massive volume and the majority are simply just not taken up

− **Extract D93**

It's the communication. If you look at the NICE hypertension guidelines which the British Hypertension Society and NICE finally agreed eventually – what the algorithm should be. With somebody like the British Hypertension Society behind the guidelines and everybody doing the same thing, suddenly everybody knows what to do. Whereas if you look at something like osteoporosis for example the British Osteoporosis Society and NICE are at odds and therefore the message is lost.

− **Extract J52**

I think generally NICE is pretty fair with the recommendations that it comes out with.

So I think it's a good source of information for healthcare professionals. I do think the reality can often be quite different in that NICE may well recommend that a certain proportion of patients with a particular disease should be treated, but actually the reality is that perhaps less patients are treated because it's difficult to adhere to NICE in a real-life clinical setting with all the time pressures and other resource pressures that a healthcare professional faces.

The findings show that companies recognize the importance of credibility in information about medicines, which should be accurate, balanced, up-to-date and should not ignore negative data. In producing and communicating information they perceive it to be credible, referring to the requirements of the ABPI Code of Practice. They accept that it may be biased or slanted towards their own medical products but perceive it still to be accurate and credible. They acknowledge that physicians and others may doubt its credibility and that changes may be needed in the way they communicate. They recognize that information from NICE is perceived to be credible, though some questioned its credibility and the perceived independence of NICE. Interviewees also suggested that the utility of NICE guidance may be low, reducing its implementation by physicians.

5.5.6.2 NICE interviews

All the interviewees at NICE expressed the view that information from the organization has a high level of credibility. Reasons given for this included the robust processes used to compile and evaluate relevant evidence, the involvement of experts and the "independent" standpoint of NICE. Two interviewees spoke of the NICE "brand" or "label" as a warrant or "stamp of credibility".

– **Extract P43**

It [information provided by NICE] is highly credible. The search strategies used to gather evidence are thorough. If relevant information has been published it will be found. There is a clear, internationally recognized methodology for synthesizing the data. The robustness of the process and the fact that it goes out for consultation and people can challenge it and that we are required to publish the responses to those challenges makes the process very credible.

– **Extract S95**

The processes are credible. The accreditation mark in NHS Evidence is about quality assurance. The NICE brand has the stamp of credibility. However, there is low awareness of the accreditation process by the users. The peer review process and the use of expert panels make it credible

– **Extract R34**

But if they [health care professionals] think of it as very high quality information: we've done an enormous amount of work to cover the research base, to use a very systematic approach, to pull together very high level experts to talk about it and think about it and to come to some conclusions and some recommendations against a very publicly known set of criteria. It means they don't have to do all that. They can just accept it – because it comes with a NICE label on it they can rely on it: it's good stuff

– **Extract Q52**

We don't unduly listen to one lobby group over another and we do get lobbied very heavily on a lot of our guidance. We're good at being very independent and coming to a collective view of what the evidence is and using the evidence and clinical opinion and public and patient opinion.

However, interviewees also recognized that it is difficult or impossible to remove all bias because the experts and others who contribute to the information and guidance issued by NICE have their own perspectives and biases:

– **Extract R111**

The more I find out about using evidence, the more it is a black art. We employ academics to do the research for us, and they sift through and they say "This study's reliable, this one's not, this one's relevant, this one's not." But we then give that lot to a load of experts who then debate it and they try to interpret what all that means, and they disagree, because they come from different perspectives, they have different backgrounds.

– **Extract T61**

I think it's very difficult to remove all bias, isn't it? Not realistic. You can always be misled for all sorts of reasons and not always intentionally. Despite the fact that, say for example we have open ... we consult on the scope of anything we do – I'm talking about guidelines specifically here – we consult on draft guidelines, we can't always be sure they're not biased because it depends on who actually takes the time to comment.

This notion of bias did not seem to extend to NICE itself except in so far as it is selective in the types and level of health care intervention for which it issues guidance:

– **Extract S96**

It is biased towards medicines and medical technologies. It is difficult to adapt it to social care and public health – developing guidance in these areas is more complicated.

– **Extract R121**

... there is a bias towards specialization and a bias towards recommending treatments in special settings.

In contrast, interviewees' perception of information provided by pharmaceutical companies was that in general it was likely to be biased and of lower credibility because of the companies' goal of making profits. This perception of bias extended to third parties or opinion leaders connected with companies.

– **Extract Q32**

There's obviously a vested interest in the pharmaceutical company to give the details on the medicine in the best possible light. They will obviously put forward only one set of information.

– **Extract T51**

Their primary purpose is to make a profit ... I know that we get articles coming in to NICE that have been produced by pharmaceutical companies, quite often with the involvement of people who we've had on guideline development groups. And

some of the things I've looked at I would say are quite often misleading in that they look as though they're coming directly from us or almost endorsed by us, given the people that they try and get to badge these things or write them for them.

‒ **Extract P33**

So if a professor of gastroenterology is invited to talk about the latest research in irritable bowel disease, and is sponsored by the makers of "Wondermab", is what he says promotional, is it communication of information, is it his opinion? It will be his opinion blended in with some promotional messages and some factual information. The fact that the company has used an eminent person to validate their position is a challenge because objectivity may go out of the window once you have a glass in your hand, a meal in front of you and a pal talking about a drug.

‒ **Extract R122**

They will only present information which helps to put forward the case they want to put forward, which is to promote their own drug. They do what they're paid to do – they pay people to promote their drugs and that's exactly what they do ... In their advertisements they put clinical trials research results and they're true – they must be true – but they're not always the whole truth. They are designed to promote a particular product and therefore they can't be objective evidence.

However, factual information from companies is perceived to be credible to a greater or lesser extent:

‒ **Extract P32**

The medical information departments of pharma companies in my experience will always rely on the Summary of Product Characteristics and the licensed indications and licensed specifications for their medicines. So I have no problem with them providing information, but there's a difference between information and promoting the product.

- **Extract Q54**

I think it [information from pharmaceutical companies] is credible. I think pharmaceutical companies are fairly responsible in the information that they produce. Obviously it's not in their interest to produce information that isn't credible or that is misleading in any way. But I think there's a "health warning" you would always have on information from the manufacturer: it is from the manufacturer, who has a vested interest in selling the product.

Interviewees commented that utility of information from NICE is not as good as it should be to meet users' needs because of the volume of information and the difficulty for users of accessing precisely the information they need. They also mentioned ways in which utility may be improved:

- **Extract T32**

The way we present things makes it often quite inaccessible for primary care, and people working in primary care perhaps want two sides of A4, no more than that, and we do nearly 1000-page books in effect on clinical topics within the guidelines programme. And also our material isn't terribly accessible digitally and we don't directly feed into decision-support systems for GPs.

- **Extract R71**

If they want to find out what NICE has said, they'll never get to.... however NICE produces its guidance and presents its information, I don't think they'll ever be able to get the bit that they want instantaneously enough to be able to deal with it in a seven-minute consultation.

- **Extract S53**

I think that NHS Evidence is a recognition that all this information and resources and evidence needs to be more easily accessible and in one place. I think the subsequent work that we're doing with NICE pathways is a recognition that guidance needs to be that accessible too. 350-page "bricks" of reports are not helpful to a specialist registrar who's about to see a breast cancer patient. Really they kind of know the bit that they need to go to but they just want to check something quickly and it's never that quick – NICE guidance – unless you're really familiar with that particular piece.

– **Extract P51**

There is a need to have greater personalization of communication and develop a more interactive electronic format of communication ... I should be able to say I want to email every GP registrar in Britain, because their information needs will be different, or I might want to email every GP with a special interest in dermatology.

When asked about information from pharmaceutical companies, interviewees suggested that it is presented in an accessible way summarized into "messages", thus having a high level of utility for the user, despite questions about its credibility:

– **Extract T63**

I have to say I take a lot of it with a pinch of salt. I certainly wouldn't use anything produced by pharmaceutical companies as the definitive source. But I can see why people sometimes would because it's easy and sometimes it's presented in a way that makes it more accessible for people who are busy particularly.

– **Extract P54**

Technologically the pharmaceutical industry will be at the leading edge because of the investment it makes in it. It will have honed and refined its messages as well as it possibly can.

These findings and those from the pharmaceutical industry interviews support the ISCM's emphasis on the importance of perceptions of credibility and utility in information behaviour. They may affect the user's choice of source – for example, information from the pharmaceutical industry may be regarded as less credible than that from NICE but it may be used because of its greater utility. The findings illustrate the contrast in perceptions by staff in NICE and those in pharmaceutical companies. Pharmaceutical industry interviewees perceived the information produced by their companies to be credible but acknowledged that it was slanted towards their companies' products. NICE interviewees perceived information from companies to be biased and potentially misleading, though factual information such as that from medical information departments is considered to be credible. Pharmaceutical company interviewees agreed that information from NICE is generally perceived as credible, though some questioned this perception, referring to NICE's focus on the cost-effectiveness of treatments and questioning the

knowledge of some of its advisers. Interviewees at NICE perceived the information that it produces to be credible because of the robust processes used to produce it and because of NICE's independence.

These differing perceptions are of interest in their own right. They are also of interest in relation to the ISCM. Because of the perceived high credibility of NICE guidance and also because NICE is part of the NHS context in which physicians work, it appears to have been assumed that physicians would readily adopt the guidance despite the fact that its utility may be poor (large volume of material, lack of resources to implement recommended treatments etc). As one interviewee put it, "NICE has been sending out huge amounts of guidance. It's incredibly high quality and robust but that in itself is not enough". The importance of utility seems now to be recognized by NICE as noted in extract S53 above: "I think that NHS Evidence is a recognition that all this information and resources and evidence needs to be more easily accessible and in one place." In contrast information from the pharmaceutical industry is considered to have relatively high utility because of its ease of access and use: "it's easy and sometimes it's presented in a way that makes it more accessible for people who are busy" (extract T63). However, its production and communication are driven primarily by commercial goals. Companies recognize that, because of this, physicians and others question its credibility and so some companies are trying to improve the way in which they communicate: "instead of simply bombarding or telling customers the key messages it's much more about trying to drive two-way dialogue" (extract B31, page 150 above).

The findings thus illustrate the potential practical value of the ISCM. By drawing attention to the concepts of credibility and utility and the factors that affect them, the model may help information providers to improve their services.

5.5.7   Possible new concepts

During content analysis of the interview transcripts a number of concepts were initially categorized under new coding terms not derived from the ISCM. Most were subsequently found to be adequately covered by the concepts identified in the ISCM. Three that required further consideration are described here.

Influencer

This term was used as a code for a range of factors apart from information that influence actions and decisions. Examples include systems that monitor physicians' prescribing or patient management activities and encourage compliance with NICE guidance:

− **Extract R44**

We know that acute trusts and larger organizations have a system for making sure that NICE guidance is embedded and used

− **Extract R82**

Then there are things like Script Switch which manage their decision making. It's used in general practice ... It manages a formulary so you can load it up with which drugs doctors are allowed to use by the practice or the PCT or whoever it is that's going to set the rules about that – the local prescribing committee probably. So if a doctor tries to prescribe something that isn't on that list there's a warning that comes up that says "You can if you really want to but you've got to give me a reason now why you're doing it".

In the ISCM these systems can be seen as information sources or products. The information that they provide concerns NHS-preferred clinical practice in accordance with NICE guidance. As with any other information, the physician may assess it and base his/her clinical decisions and actions upon it or else ignore it.

Other factors influencing physicians' decisions and clinical practice are constraints imposed by NHS contracts and policies:

− **Extract R35**

How they choose to use it [NICE guidance] is to some extent between them and their clinical practice, constrained by factors like commissioning contracts, and national criteria and all sorts of other strategic stuff that sits around it.

In the ISCM these factors form part of the physicians' context or working environment.

The term was also applied to individuals who are asked by or sponsored by an information provider (e.g., a pharmaceutical company) to communicate to users (e.g., physicians). The individual may be an opinion leader who may influence physicians' clinical practice, perhaps in favour of the company's medicines:

- **Extract P33**

  So if a professor of gastroenterology is invited to talk about the latest research in irritable bowel disease, and is sponsored by the makers of "Wondermab", is what he says promotional, is it communication of information, is it his opinion? It will be his opinion blended in with some promotional messages and some factual information.

In the ISCM such an intermediary is an information provider who may be linked to another provider (arrow ⑤ in Figure 28).

Another "influencer" is the law and regulations, which may affect the actions of the information provider:

- **Extract P31**

  the MHRA puts a standard specification on the information that should be attached to any promotional material that's provided by the pharmaceutical industry

Regulations affecting information providers and related guidelines such as the ABPI Code of Practice for the Pharmaceutical Industry can be seen in the ISCM as part of the context or environment in which they operate.

After considering each use of the term "influencer" it was found that all could be covered by existing concepts in the ISCM and the model did not need to be modified.

Intermediary

This term was used as a code for people who looked for information on behalf of others:

- **Extract S34**

What's interesting is that of our users over 95% seek the information themselves. I can tell you the figures actually – we have 51% say they only obtain it themselves and never ask somebody else and 40% say they mostly obtain it themselves. Then only about 6% say it's half and half – half the time they look themselves, half the time they ask somebody else. Nurses and doctors are actually more likely to look for the information themselves, managers and commissioners are more likely to use a third party.

- **Extract S42**

We have had a number of medicine information pharmacists involved in our studies and it's quite fascinating talking to them because they are such prolific users of online information. They are online and searching four, five, six, seven times a day and they seem to support the information needs across role groups but particularly with nurses and doctors

An intermediary may also be somebody who works with physicians and draws their attention to communication from a provider such as NICE:

- **Extract R61**

We'll probably email every GP in the country and some of them will open it and some of them won't. Probably the practice manager is going to be the key to this – using practice managers to communicate with and suggest that they put it on the agenda for the practice meeting – unless there's a keen partner.

In the ISCM such intermediaries are information users who, once they have found information, become providers who communicate it to other users. They are thus already represented by the model.

Wider environment

The ISCM refers to the environmental context of an information user or provider. This does not refer simply to the local environment in which the user or provider operates such as the hospital or practice within which a physician works or the environment within a particular company or within NICE. A wider environment such

as politics and government may affect information behaviour as illustrated in the following extracts:

− **Extract R12**

We have a fairly strategic way of planning who we'll go to see based on what's going on in the environment in the health service, in NICE and politically

− **Extract S51**

I must admit in the work I'm doing now I feel like we have a requirement from government to effect change in terms of behavioural change for research-based practice

The environmental context for companies reaches beyond the UK:

− **Extract F11**

A lot of our directives and SOPs are European that we have to work with.

The environments of a user and a provider may overlap. For example, both health care professionals and NICE operate within the NHS environment. When producing information about their medicines, pharmaceutical companies are also influenced by the NHS environment – for example, the focus on cost-effectiveness:

− **Extract C62**

We are a cost-effectiveness market place and therefore clinical effectiveness is not enough. It has to be the clinical effectiveness within the framework of the politics of the environment, which has to be cost. Balancing those two needs is what we work hard to try and do.

The pharmaceutical industry and NICE are influenced in the information that they produce by the working environment and consequent needs of physicians. As reported in section 5.5.5 both providers engage in two-way communication with physicians to understand their needs and to provide information that meets those needs:

– **Extract B33**

What we're now trying to do is have much more of a two-way account management dialogue. So information exchange which creates a bespoke or a co-created solution for a particular locality.

– **Extract R52**

We're going to try to better match pieces of guidance which have a major impact on primary care and tailor the support that we provide better to support primary care.

A separate term, "wider environment", is not needed in the ISCM but the environmental context should be taken to include elements of the wider environment that may affect an information actor's behaviour.

5.6   Discussion and conclusions

The content analyses of the pharmaceutical industry and NICE interview transcripts provide strong support for the validity of the Information Seeking and Communication Model. Not only do they endorse the relevance of the model to these different types of information provider but they also provide further verification, in addition to the evidence reported in Chapter 4, of its relevance to physicians as information users.

The findings demonstrate that the information behaviour of providers mirrors that of users as depicted in Figure 28. They substantiate the fundamental importance of context and related factors in the information behaviour of both providers and users. These affect needs, wants, goals, perceptions and motivating and inhibiting factors, and the resulting information seeking, information assessment and use, communications, decisions and actions.

The findings highlight differences and similarities between the pharmaceutical industry and NICE as information providers. Companies have a commercial goal: "we want to sell our drugs" (extract F101); whereas NICE aims to be the source of the "highest possible quality" information for health care professionals (extract R32). Both, however, seek to influence the clinical behaviour of physicians. A pharmaceutical company wants to "drive appropriate uptake" of the company's

medicines (extract B11) and NICE wants physicians to "follow the recommendations" that it issues (Extract Q22).

The behaviour of pharmaceutical companies is influenced not only by their own commercial environment but also by requirements from the wider environment, notably legislation and the industry's code of practice: "We in the industry have the ABPI Code, which we must adhere to" (extract N71). NICE is guided by its remit from the Department of Health: "We're more the servants of the Department of Health I suppose than we are of the doctors and practitioners who use our guidance" (extract R42).

Both the pharmaceutical industry and NICE perceive the information that they produce to be credible but they also recognize that physicians' perceptions may be different. An industry interviewee commented: "I feel it [information from the pharmaceutical industry] is quite credible but I think the external perspective ... when you speak to the healthcare professionals – they feel it's not as credible because there is this perception that companies are not telling the truth" (extract J71). In the case of NICE, perceived credibility is not a problem but the relevance or utility of its information may be: "I think we're quite often perceived as doing things in an overly academic ivory tower type of way and what we do isn't necessarily tailored to a more generalist audience" (extract T31).

The model is not intended to give a detailed representation of every aspect of information behaviour. It does not, for example, describe exactly how a user assesses and processes information or how a provider produces information products. As with other models, the aim of the ISCM is to highlight important elements of the process being modelled and the factors affecting them. It is hoped that by drawing attention to the features of information behaviour it will have practical value in helping users and providers to review and improve how they seek, use and communicate information. An example of the value of focusing on the factors affecting information behaviour has been given in section 5.5.6. By understanding the importance of the utility as well as the credibility of its information products and making them easier to access and use, NICE is improving the way in which it meets health care professionals' needs. Conversely pharmaceutical companies recognize the importance of improving their perceived credibility and are changing the way in which they communicate with physicians.

By endorsing the validity of the ISCM this research also provides support for the models described in Chapter 2. This is a significant new finding because it demonstrates the practical relevance of key elements of these models in environments (health care and the pharmaceutical industry) that are different from those in which most of the models were developed.

A further highly important aspect of the research is that the new model has been developed by building on previous work. It thus answers the criticism (Case, 2002, page 284; Wilson, T.D., 1999) that research in LIS fails to build on existing theory. In addition it takes a novel approach in using existing theory not only from library and information science but also from communication studies. As a result the ISCM is more comprehensive in scope than most other models, covering as it does the information user, information seeking and use, the information provider and communication.

The other key criticism of LIS research is its questionable practical value (Case, 2002, page 287). To answer this, the ISCM has been used to study information behaviour in evidence-based medicine. The findings are reported in the next chapter.

Chapter 6

The relevance of the new model: evidence-based medicine (EBM)

6.1   Introduction

Evidence-based medicine has been defined and widely quoted as meaning: "the integration of best research evidence with clinical expertise and patient values" (Sackett *et al.*, 2000; Centre for Evidence-Based Medicine Toronto: http://ktclearinghouse.ca/cebm/intro/). It has had a profound influence around the world since the 1990s, not least in the UK, where it is a guiding principle in the NHS. Many information resources are now available to support evidence-based decision making in health care, such as:

- NICE: http://www.nice.org.uk/

- NHS Evidence: https://www.evidence.nhs.uk/

- the Centre for Reviews and Dissemination: http://www.crd.york.ac.uk/CMS2Web/

- the Cochrane Library: http://www.thecochranelibrary.com/

- Clinical Evidence: http://clinicalevidence.bmj.com/ceweb/index.jsp

- ACP Journal Club: http://acpjc.acponline.org/

- Bandolier: http://www.medicine.ox.ac.uk/bandolier/

However, despite the ready availability of such resources and the support and guidance provided by bodies such as NICE, there have been frequent suggestions that doctors and others do not make sufficient use of up-to-date evidence about treatments (Cochrane *et al.,* 2007; Gagliardi et al., 2011). The ISCM can be of help in investigating this anomaly. The practice of EBM depends on effective information behaviour – on clinicians seeking, finding, evaluating and using evidence to inform their decisions about the treatment of patients, and on the communication of such evidence by providers such as NICE. By using the ISCM to explore this information behaviour, insights may be gained into reasons why clinical practice does not always follow EBM principles and guidelines.

This chapter first reviews the literature about evidence-based medicine: its history, its rationale and practice as a logical approach to medical decision-making and

treatment. Criticisms that have been made about it are then considered, with responses to those criticisms and perspectives that the ISCM provides. The ISCM is then used to suggest possible changes to information behaviour by physicians, pharmaceutical companies and NICE in order to improve the practice of EBM.

6.2 Literature review: evidence-based medicine

The term "evidence-based medicine" was first used by Guyatt and colleagues in the early 1990s (Guyatt, 1991; Evidence-Based Medicine Working Group, 1992) and they described it as a "new paradigm for medical practice." The concept had a great impact and since then a large number of articles and books have been published on EBM and how to practise it (e.g., Glasziou *et al.*, 2003; Gosall and Gosall, 2012; Gray, 1997; Green and Britten, 1998; Greenhalgh, 2002; Greenhalgh, 2010; Grol and Grimshaw, 2003; Guyatt and Rennie, 1993; Howick, 2011; Rawlins, 2008; Sackett *et al.*, 1996; Straus *et al.*, 2011; Straus and Jones, 2004).

It is open to question whether EBM should be considered as truly a "new paradigm" since the principles behind it are not entirely new. In 1972, for example, Professor Archie Cochrane published an influential book, *Effectiveness and Efficiency* (Cochrane, 1972), in which he suggested that health care should be based on treatments that had been shown to be effective in properly designed evaluations. He emphasized the importance of evidence from randomized controlled trials of therapies. Nevertheless, the renewed emphasis on using evidence to guide clinical practice and the systematic approach used in EBM have had a profound influence.

6.2.1 The practice of EBM as proposed by its advocates

Advocates of EBM emphasize that logical principles should govern clinicians' decisions and actions. Straus *et al.* (2011) in their widely read textbook, *Evidence-Based Medicine: How to practice and teach it*, concisely summarize the practice of EBM in the following five steps:
1. Convert the need for information about diagnosis, treatment, prognosis etc into an answerable question
2. Track down the best evidence with which to answer that question
3. Critically appraise that evidence for its validity (closeness to the truth), impact (size of the effect) and applicability (usefulness in clinical practice)

4. Integrate the critical appraisal with clinical expertise and with the patient's unique biology, values and circumstances

5. Evaluate the clinician's effectiveness and efficiency in executing steps 1-4 and seek ways to improve them

Straus *et al.* provide guidance on how to carry out each of these steps, emphasizing the importance of formulating clear questions and choosing appropriate sources to find the best evidence. They describe how to assess evidence about therapies, diagnostic techniques, reports on prognosis and reports about side-effects or harmful outcomes of treatments.

6.2.2 The rationale for EBM

A key reason for the rise of EBM is the view that the treatment of patients has in the past often been based on the experiences, opinions and possible prejudices of clinicians and authority figures rather than on an objective assessment of which therapies are most likely to be effective. There is much evidence to support this view. Antman *et al.* (1992), for example, reviewed the findings from controlled clinical trials of treatments used to reduce mortality in patients who had suffered myocardial infarction. The findings were compared with recommendations given in review articles and textbooks. Antman and colleagues found that reviews and textbooks were often slow to mention important advances in treatment but continued to recommend older, less effective therapies when newer treatments had been shown to be better. Conversely, some reviewers recommended therapies that had been shown in clinical trials to be ineffective or harmful. In the earliest article about EBM, Guyatt (1991) contrasted the "way of the past" in medical practice with the "way of the future" based on EBM principles: "Clinicians were formerly taught to look to authority (whether a textbook, an expert lecturer or a senior local physician) to resolve issues of patient management. Evidence-based medicine uses additional strategies, including quickly tracking down publications of studies that are directly relevant to the clinical problem, critically appraising these studies, and applying the results of the best studies to the clinical problem at hand."

It is often assumed that experienced physicians deliver high-quality care because of the knowledge and skills they have accumulated during their years in practice. However, Choudhry *et al.* (2005) showed that this assumption is not justified. They carried out a systematic review of studies that evaluated the effect of clinical

experience on the quality of medical care. Physicians' performance was measured in different ways in different studies; measures included assessment of physician's knowledge, their adherence to standards of practice or therapy and the health outcomes in the patients they treated. Of 62 studies, 47 (76%) reported a decrease in physicians' performance over the course of their clinical careers. In 13 studies (21%) no association between performance and experience was found, and only two studies (3%) found an increase in performance over the course physicians' careers. Summarizing their findings, Choudhry *et al.* commented: "Physicians who have been in practice longer may be at risk for providing lower-quality care. Therefore, this subgroup of physicians may need quality improvement interventions." The findings endorse the importance of clinical practice that is based on up-to-date knowledge and evidence, i.e. evidence-based medicine.

A related reason for the rise in EBM is the increasing difficulty of managing the information overload that clinicians have to deal with. In this regard Straus *et al.* (2011, page 2) state: "The spread of EBM has arisen from several realizations:
1. Our daily need for valid and quantitative information about diagnosis, prognosis, therapy and prevention...
2. The inadequacy of traditional sources for this information because they are out of date (traditional textbooks), frequently wrong (experts), ineffective (didactic continuing medical education) or too overwhelming in their volume and too variable in their validity for practical clinical use (medical journals).
3. The disparity between our diagnostic skills and clinical judgment, which increase with experience, and our up-to-date knowledge and clinical performance which decline.
4. Our inability to afford more than a few seconds per patient for finding and assimilating this evidence or to set aside more than half an hour per week for general reading and study.
5. The gaps between evidence and practice ... lead to variations in practice and quality of care."

EBM represents a logical approach in which a clinician's decisions about a patient's treatment take into account the best evidence about appropriate therapy in conjunction with the clinician's own expertise and the particular needs of the patient. The main goal of EBM information resources such as those listed above (section 6.1) and of NICE is to support clinicians in keeping their knowledge and practice up to date in line with current evidence. Another important aim is to help them deal with

information overload by providing ready access to relevant information and evidence.

6.2.3 Factors affecting the uptake of EBM

In view of EBM's logical rationale and its support by NICE and others, rapid acceptance and adoption of EBM principles by the medical community might be expected. Numerous studies have shown, however, that there continue to be discrepancies between clinical practice and up-to-date evidence about effective treatment, and that evidence-based guidelines are underused (Boissel *et al.,* 2004; Buchan, 2004; Cochrane *et al.,* 2007; Davis *et al.*, 2003; Gagliardi et al., 2011; Haines *et al.* 2004). The ISCM has been used to investigate the practice of EBM in order to identify aspects of information behaviour that may help to explain this "knowledge-implementation gap" (Sanders and Haines, 2006).

The five steps of EBM of Straus *et al.* (2011) are all aspects of information seeking behaviour and can be described in terms of the ISCM as illustrated in Table 5:

Step	EBM	ISCM
1	Convert the need for information about diagnosis, treatment, prognosis etc into an answerable question	Clarify **needs**
2	Track down the best evidence with which to answer that question	**Seek information**
3	Critically appraise that evidence for its validity (closeness to the truth), impact (size of the effect) and applicability (usefulness in clinical practice)	**Assess information:** validity relates to **credibility**; impact and applicability relate to **utility**
4	Integrate the critical appraisal with clinical expertise and with the patient's unique biology, values and circumstances	**Seek information** about the individual patient. **Use information** from steps 3 and 4 in **context: personal context** [expertise] **and environmental context** [treatment of patient]. Take **decision/action** on appropriate treatment.
5	Evaluate the clinician's effectiveness and efficiency in executing steps 1-4 and seek ways to improve them	**Seek information** on effectiveness of treatments used and take **decision/ action** to make changes if necessary

Table 5: The steps in EBM and aspects of information behaviour

The ISCM reveals that this apparently straightforward, logical approach masks a number of important issues. As may be seen from Table 5, the five steps include only some of the facets of information behaviour and factors affecting them that are identified in the ISCM. Some others are implied – for example, choosing information sources or products, the physician's goals in seeking information (these are presumably to manage patients in the most effective way), the use of information to increase knowledge, and the possibility of dismissing information if it does not meet the physician's needs. Those elements of the ISCM that are identified or implied in Table 5 are highlighted in green in Figure 29. The remaining aspects of information behaviour, not mentioned or implied in the five steps, are highlighted in red.
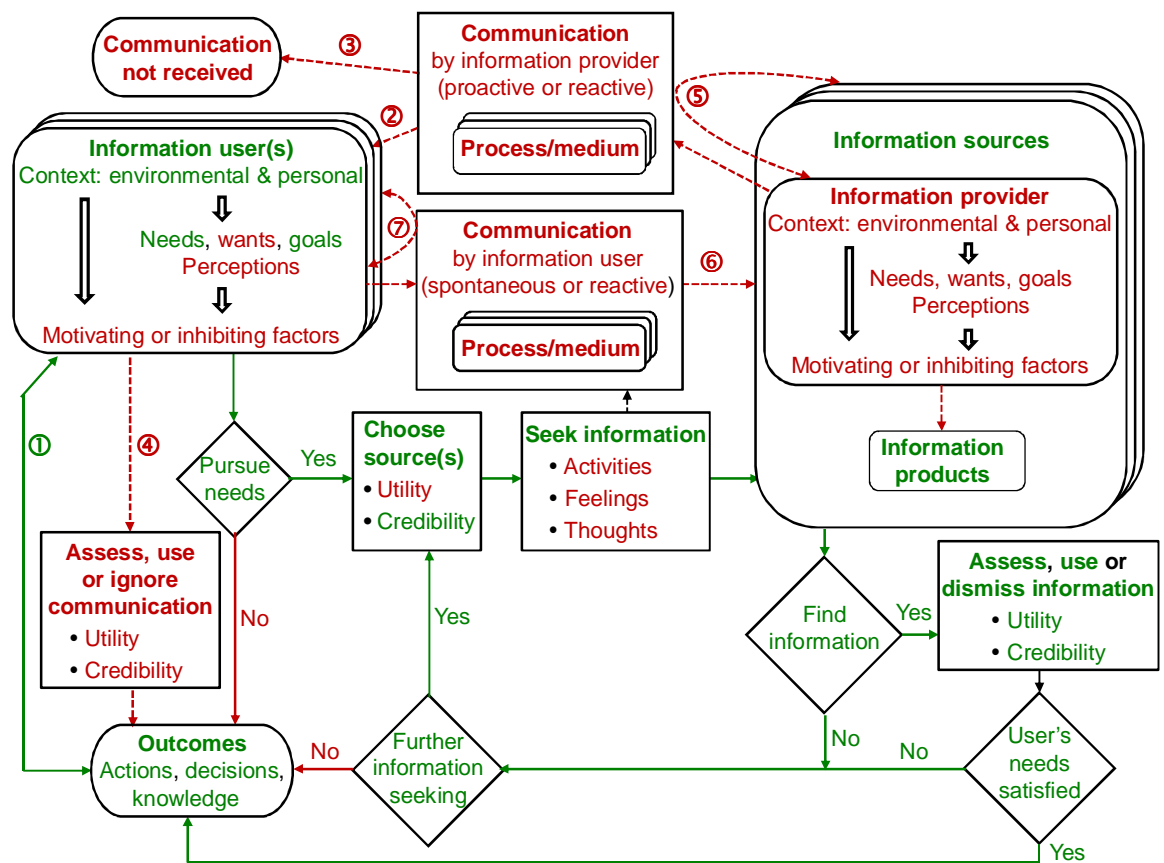
Figure 29: The ISCM and the five steps of EBM

Green: elements of information behaviour identified or implied in the five steps

Red: elements of information behaviour missing from the five steps

Examination of Figure 29 reveals a number of important components of information behaviour that the stepwise approach to EBM advocated by its proponents fails to emphasize. Notably these include information providers, the contexts in which they

operate, their goals, motivating and inhibiting factors, their perceptions and the communications that they produce. The focus of the five-step approach is on the clinician as an information user but again the picture is incomplete. There is no reference to factors that motivate or inhibit clinicians' information seeking or to the influence of perceptions on their information behaviour.

Consequently the five steps do not explicitly take into account possible differences between EBM information providers and clinicians in their contexts, goals, perceptions etc. For example, the role of NICE, as described in Chapter 5 (section 5.3) is to provide national guidance on health care. It produces communications in the form of clinical guidelines for the management and treatment of patients. It also produces technology appraisals, which are recommendations on the use in the NHS of new and existing medicines and treatments. The technology appraisals determine whether particular therapies may be used in the NHS – medicines are not likely to be approved for use if they are not deemed to be cost-effective. Thus key goals of NICE are to influence physicians' clinical practice in accordance with what it judges to be the best evidence and to regulate what they may prescribe in the NHS. However, the context of NICE – the environment in which it operates, its culture and the experience of its staff and advisers – differs from that of many clinicians. The interviews reported in Chapter 5 revealed that NICE is sometimes seen as operating in an "ivory tower" and that its recommendations do not always take into account the limited resources or time constraints that may affect physicians' capabilities. NICE has a mandate from government to ensure that medicines are cost-effective (Secretary of State for Health, 2005) and this goal may conflict with the needs and wants of healthcare professionals, patient groups and others, who may question the focus on cost-effectiveness that may prevent NHS patients from receiving certain new drugs (Ferner and McDowell, 2006; Speight and Reaney, 2009).

The five steps suggest that the clinician should always seek information if he/she is uncertain (and go on seeking it if searches are initially unsuccessful), rather than relying on knowledge and experience. It is implied that the clinician must go through steps 1 to 5, appraising and using information in an objective way. Yet, as the ISCM shows, the choice of information sources and the appraisal or assessment of information are strongly influenced by the information user's perceptions of their credibility and utility. Although step 2, "Track down the best evidence", implies that the clinician should choose credible sources, no insight is given into the perceptions or subjective elements involved in that choice. In practice, as reported in section

4.2.6, clinicians may choose sources because of their ready availability (utility) despite reservations about their credibility.

Examining just the five steps does not of course allow a detailed critique of evidence-based medicine since they provide only an outline of this approach to EBM; Straus and colleagues describe the application of each step in detail in *Evidence-Based Medicine: How to practice and teach it*. Nevertheless, using the ISCM to examine the main points of the approach summarized in the five steps prompts questions about the recommended practice of EBM – in particular: who decides on the appropriate sources and their credibility? It is clear from the recommendations of EBM advocates that the decision is not left to the clinician. Straus *et al.* (2011) give advice on how to find "current best evidence", in which they recommend certain sources over others. They dismiss most books – "Burn your (traditional) textbooks" – because they may be inaccurate and out of date. They thereby imply that textbooks have low credibility, but this judgement does not take into account the perspective of a busy physician for whom a textbook on the shelf has high utility and may have acceptable credibility if the therapy area of interest has not changed greatly since the book was published.

The practice of EBM involves the critical appraisal of information. This is time-consuming and may not often be feasible for busy physicians. Straus and colleagues recommend that, rather than using medical journals, health care professionals should use secondary sources dedicated to EBM such as ACP Journal Club (http://acpjc.acponline.org/) and the Evidence-Based Medicine website (http://ebm.bmj.com/), both of which summarize findings from clinical trials and other evidence reported in the literature. These are considered to provide the "best evidence" because it is selected "according to explicit criteria". The Evidence-Based Medicine website describes the process as follows: "**Evidence-Based Medicine** systematically searches a wide range of international medical journals applying strict criteria for the validity of research. Experts critically appraise the validity of the most clinically relevant articles and summarize them including commentary on their clinical applicability." This process of critical appraisal is step 3 in the five-step approach (Table 5). Although the terms credibility and utility are not used, "validity" implies credibility, while "impact" and "applicability" imply utility. Once again the ISCM prompts the question: whose perception of credibility and utility is most important? Proponents of EBM frequently state that randomized controlled clinical trials (and reviews of such trials) provide the best or most credible evidence about

the effects of medicines: "Randomized trials and systematic reviews of randomized trials provide the highest quality evidence – that is, the lowest likelihood of bias, and the lowest likelihood to mislead because they establish the effect of an intervention" (Straus *et al.*, 2011, page 7). However, this view does not take into account the perception of a physician who may question the relevance of findings from specially selected and closely monitored patients in clinical trials to a particular patient he or she is treating. In the physician's context such evidence may be perceived to have low utility because of lack of relevance to the patient or because the treatment may require resources that are not available.

From this discussion it can be seen that the ISCM as shown in Figure 29 highlights the fact that the practice of EBM put forward by advocates in the five-step approach fails to take account of or make clear all the relevant aspects of information behaviour. From the ISCM it may therefore be hypothesized that the real-world practice of EBM differs from the ideal, logical process put forward by its supporters. To investigate this it is helpful to review criticisms that have appeared about EBM in the literature and problems that they highlight about the practice of EBM, to assess the validity of the criticisms and then to use the ISCM to examine aspects of information behaviour that may elucidate these problems.

6.3   Criticisms of evidence-based medicine: literature review

Since evidence-based medicine started to be widely promulgated in the early 1990s (Evidence-Based Medicine Working Group, 1992) its validity has frequently been challenged (e.g. Anonymous, 1995; Charlton and Miles, 1998; Feinstein and Horwitz, 1997; Grahame-Smith, 1995; Goldenberg, 2009; Harari, 2001; Holmes *et al.*, 2006; Miles, 2009). Cohen *et al.* (2004) categorized the major criticisms of EBM appearing in the literature into five different types:
   a) EBM is based on empiricism and is a poor philosophical basis for medicine;
   b) the EBM definition of evidence is narrow and excludes information important to clinicians;
   c) EBM is not evidence-based;
   d) the usefulness of applying EBM to individual patients is limited;
   e) EBM threatens the autonomy of the doctor-patient relationship.

While supporting EBM, Djulbegovic *et al.* (2009) listed five main points made by those who criticize it:

1. reductionism in scientific method;
2. a neglect of postmodernist ideas of social importance of science activity;
3. the need to acknowledge patients' values and their subjective experience, as well as physicians' "tacit knowledge" gained through a long practice of medicine;
4. an inadequate framework for successful problem-solving and decision-making;
5. lack of evidence that EBM improves patient outcomes.

These two lists are similar. Point a) in the first list is related to points 1 and 2 in the second. Point b) corresponds to 3, c) has the same meaning as 5, while d) and e) correspond to 4 and 3, respectively.

The validity of these criticisms is open to debate (Djulbegovic *et al.*, 2009; Howick, 2011; Straus and McAlister, 2000) but they are helpful in drawing attention to issues that affect the practice of EBM and so they are considered further in the following sections. For each main criticism, the arguments put forward by critics are outlined followed by some of the counterarguments supporting EBM. The ISCM is then used to highlight factors affecting information behaviour relevant to these arguments and in so doing it clarifies potential problems in the implementation of EBM.

6.3.1   EBM is based on empiricism and is reductionist

6.3.1.1 The criticism

EBM refers to the positivist tradition in that the "best" evidence is sought from experimental studies (clinical trials) in which "objective" measurements are recorded. Examples are patients' blood pressure, weight, lung capacity, bone density etc., and signs of disease such as the presence of ulcers, tumours or pathogens, or abnormal haematological or biochemical measurements. In many cases, however, important characteristics of illness cannot be measured objectively. For example, in the assessment of pain, depression or anxiety, visual analogue scales and rating scales are often used, which involve subjective assessments by the patient or the clinician (McDowell, 2006). In other cases, in which it is difficult to measure the clinical value of an intervention, secondary measurements or surrogate endpoints are used but they may not reliably predict the effect on the clinical outcome (Fleming and DeMets, 1996). For example, clinical trials of drugs to treat

heart disease may measure their effect on blood pressure rather than more complex assessments of their effects on patients' quality of life and the long-term outcome of mortality reduction. The evidence used in EBM, therefore, is not always objective or conclusive.

The frequent assertion by proponents of EBM that it is based on the "best evidence" implies objective evidence, but this assertion fails to emphasize the fact that interpretation and application of evidence involves subjectivity – for example, the interpretation of rating scales or the clinical significance of biochemical abnormalities. As Goldenberg (2006) comments, "The appeal to the authority of evidence that characterizes evidence-based practices does not *increase* objectivity but rather *obscures* the subjective elements that inescapably enter all forms of human inquiry. The seeming common sense of EBM only occurs because of its assumed removal from the social context of medical practice."

The relevance of findings from clinical trials to the care of individual patients has also frequently been questioned. Feinstein and Horwitz (1997) comment: "Derived almost exclusively from randomized trials and meta-analyses, the data do not include many types of treatments or patients seen in clinical practice; and the results show comparative efficacy of treatment for an "average" randomized patient, not for pertinent subgroups formed by such cogent clinical features as severity of symptoms, illness, comorbidity, and other clinical nuances ... Randomized trial information is also seldom available for ... clinical decisions that depend on pathophysiologic changes, psychosocial factors and support, personal preferences of patients, and strategies for giving comfort and reassurance."

Howick (2011) states that EBM has a "compelling rationale" but comments that it leads to paradoxes. In particular he notes that "many of the treatments in whose effectiveness we have most confidence – that we consider most strongly supported by evidence – have never been supported by randomized trials of any description. These treatments include automatic external defibrillation to start a stopped heart, tracheostomy to open a blocked air passage, the Heimlich maneuver to dislodge an obstruction in the breathing passages, rabies vaccines, penicillin for the treatment of pneumonia, and epinephrine injections to treat severe anaphylactic shock."

Referring to reductionism, Welsby (1999) comments: "In clinical medicine a balance needs to be struck between reductionism (the view that a system can be fully

understood in terms of its isolated parts) and holistic complexity appreciation (the view that the whole may not be discernible from knowledge of its parts)." He notes that EBM clinical guidelines are of value particularly in the management of straightforward problems: "No one should doubt that knowledge of guidelines and protocols is very important (mostly for single simple problems)". However, physicians are often faced with patients with complex problems that may be difficult to diagnose precisely or who have several disorders. In such cases guidelines may be of limited utility: "Appreciation of the 'Big Picture', surely a fundamental aim of medical education, will not be achieved by trotting out a succession of 'little picture' guidelines".

6.3.1.2 The counter-argument

Djulbegovic *et al.* (2009) agree that these criticisms have "some legitimacy". However, they assert that "EBM's strong elements of reductionism have facilitated a pragmatic approach to clinical problem-solving ... EBM proponents have recognized from the beginning the limitation of inferences from group observations ... and the need for decision-making to reflect patient values ...." The definition of EBM cited at the beginning of this chapter makes this clear: "the integration of best research evidence with clinical expertise and patient values" (Sackett *et al.*, 2000). Thus EBM does not mandate a reductionist approach in which treatment is based solely on empirical evidence from clinical trials. Early in the development of the EBM movement its leading advocates stated: "Good doctors use both individual clinical expertise and the best available external evidence, and neither alone is enough" (Sackett *et al.*, 1996).

6.3.1.3 The perspective from the ISCM

The above criticisms highlight in particular the importance of utility: the relevance and usefulness of information/evidence from clinical trials to the physician or other health care professional in his/her context of treating a particular patient. Such information may have high credibility in that it derives from well designed clinical trials carried out by reputable clinicians and it may have been analysed by authoritative bodies such as NICE. However, a physician treating a patient may perceive it to have low utility if the clinical relevance of the findings to that patient is not clear – for example, if the patients studied in the trials differ in age, ethnicity, co-morbidities etc. from the physician's patient. Similarly if the method of treatment

used in trials is very different from that possible for the physician – if, for example, it requires special equipment or if the patient has to be monitored very frequently – the findings will be perceived to be of low utility. Thus the type of empirical evidence promoted by proponents of EBM as the "best" evidence – from their perspective the most credible – may not be used by physicians because of its low utility in their context.

While it is clear that the proponents of EBM recognize the importance of the clinician's expertise and the individual patient's needs, there will still be differences in perception – between a clinician and NICE, for example – of the credibility and utility of evidence. The ISCM by highlighting the importance of context-related perceptions of utility and credibility in information behaviour provides reasons why EBM is not put into practice in the apparently logical way proposed by advocates.

6.3.2   Philosophical issues and EBM

6.3.2.1 The criticism

There has been much discussion about the philosophical basis of EBM and the potential value of postmodernist perspectives (Charlton and Miles, 1998; Djulbegovic *et al.*, 2009; Goldenberg, 2006, 2009, 2010; Howick, 2011; Miles, 2009; Silva and Wyer, 2009). Miles, who has been a consistent and vociferous critic of EBM (Miles, 2006, 2009; Miles *et al.*, 1999, 2004, 2006, 2008; Miles and Loughlin, 2011) comments: "The immediately controversial nature of the EBM thesis, with its talk of the 'radical restructuring of medical knowledge', 'paradigm shifts' ... and its attempts to distinguish 'active, evidence-based clinicians' from 'passive, opinion-based spectators of clinical practice' ... resulted in a visceral reaction of the international medical community that has, over time, forced one concession from EBM after another, so that the serial reconstitutions of EBM have left the foundational claims of EBM in conceptual and methodological ruins" (Miles, 2009).

One of the key principles of EBM is that it should be based on an objective assessment to determine the best evidence. Goldenberg (2006, 2009) discusses the criticisms of EBM from philosophical perspectives and points to the "untenability of the objectivist account of evidence". Referring to the apparent belief among EBM advocates that the "best evidence" obtained from clinical trials provides an "objective" view of reality, Goldenberg contrasts that with a post-positivist

perspective that evidence is situated in a social context and is subject to the biases and perspective of the observer: "'evidence' is a social product, influenced by the variable power and authority held by different stakeholders (patients, medical researchers, hospital administrators, clinicians, policy makers, etc.) ... While evidence-based approaches are concerned with finding the best evidence (according to their predefined standards) to answer research and treatment questions, the critics ask the challenging question: *whose* evidence is setting the standard of best practice..?" (Goldenberg, 2009). She continues: "this objectivist ontology, where the evidence 'speaks' and reliable knowledge follows, presents an occupational hazard to (actual) medical practice. Subjective content muddies up even the most rigorous evidence-based practice by the inescapable layers of interpretation and sociocultural influence that enter in the setting of research agendas (including what projects gets funded and why), the production of evidence in primary research, and the selection of which evidence is chosen to inform policy and practice ... Conflicting value judgments about evidence and pressures exerted by stakeholders render health policy making a political process" (Goldenberg, 2009).

As Goldenberg's comments suggest, the idea that assessments of evidence can be carried out in a completely objective and independent way is untenable philosophically and in practice. NICE, the leading provider of EBM guidance in the NHS in England is widely seen to be trustworthy partly because of its perceived independence. NICE itself makes the claim: "We provide independent, authoritative and evidence-based guidance on the most effective ways to prevent, diagnose and treat disease and ill health" (http://www.nice.org.uk/aboutnice/). Yet "independence" is no guarantee that information or guidance is unquestionably reliable. The Drug and Therapeutics Bulletin also proclaims its independence as a source of guidance and information (http://dtb.bmj.com/): "For 50 years, Drug and Therapeutics Bulletin (DTB) has provided rigorous and independent evaluations of, and practical advice on, individual treatments and the overall management of disease for doctors, pharmacists and other healthcare professionals. DTB has always been wholly independent of the pharmaceutical industry, Government and regulatory authorities". However, NICE and the Drug and Therapeutics Bulletin issued conflicting guidance about the use of zanamivir to treat patients with influenza. NICE guidance states that zanamivir may be given to patients at risk who can start treatment within 48 hours of the first sign of symptoms (http://guidance.nice.org.uk/TA168). In contrast the Drug and Therapeutics Bulletin recommended that zanamivir should not be used because of limited effectiveness (Anonymous, 2001). Commenting on this situation,

Joe Collier, the editor of the Drug and Therapeutics Bulletin, noted that in health care "conflicting advice is common and usually legitimate" and that "conflicts may be explained because the interests/terms of reference of the information providers vary and so are at odds with your perspective and those of each other" (http://blogs.bmj.com/bmj/2008/09/26/joe-collier-coping-with-conflicts-and-uncertainty/).

What is regarded as "objective" evidence may be determined partly by perceptions of the source from which it comes. Thus health care professionals may regard information and clinical trials data originating from the pharmaceutical industry as biased (Collier and Iheanacho, 2002; Goldacre, 2012; Lexchin *et al.*, 2003) because of industry's commercial goals, whereas information emanating from the NHS may be considered to be impartial. NHS Evidence, for example, is said to exclude "anything that might be biased or partial" (http://nice.systemassociates.co.uk/nhsevidence/), though this is the perception of NICE, which is responsible for NHS Evidence.

6.3.2.2 The counter-argument

Straus and McAlister (2000) have commented on common criticisms of EBM, describing some of them as misperceptions. The assertion by Miles (2009) that EBM sets out to "distinguish 'active, evidence-based clinicians' from 'passive, opinion-based spectators of clinical practice'" can be seen as one such misperception or an exaggerated portrayal of EBM. As has been pointed out in section 6.2, one of the main reasons for the rise of EBM was the fact that the treatment of patients in the past was often based on the experiences, opinions and possible prejudices of clinicians and authority figures rather than on an objective assessment of the available evidence. The proponents of EBM set out to encourage a more rational approach to clinical practice based on good evidence but also on the clinician's experience, as is clearly stated in their definition of EBM. They do not view clinicians as "spectators" but rather as active decision-makers.

Comments such as those of Goldenberg (2006, 2009) about the philosophical criticisms of EBM carry some weight and few defenders of EBM have adequately addressed these criticisms (Djulbegovic *et al.*, 2009; Howick, 2011; Miles, 2009; Tonelli, 2011). However, they need to be put in perspective. No serious commentator suggests that the positivist approach to modern medical research in

itself produces invalid evidence or that a focus on evidence is inappropriate. On the contrary, Goldenberg (2009) herself refers to the "desirable pragmatic features of the evidence-based approach". Since the introduction of controlled clinical trials in the 1940s (Medical Research Council, 1948), a huge number of treatments have been tested and introduced into clinical practice, improving patients' health and saving lives (Weatherall *et al.*, 2006). Nobody suggests that a different philosophical approach would have led to more productive research. Nevertheless, the philosophical criticisms are of value in contesting the nature of the evidence used in EBM: in Goldenberg's words, "*whose* evidence is setting the standard of best practice..?"

6.3.2.3 The perspective from the ISCM

The ISCM depicts the importance of context and the influence that it has on perceptions, including perceptions of the credibility and utility of information. The findings and arguments reviewed above endorse these aspects of information behaviour, which are not fully taken into account in the exposition of EBM put forward by its proponents (Table 3) and which affect its implementation. The ISCM provides a very similar perspective to Collier's when he commented on the contrasting recommendations by NICE and the Drug and Therapeutics Bulletin about zanamivir: the different contexts of information actors – whether providers or users – result in different perceptions, especially of the credibility and utility of information.

The perception by NICE and other EBM information providers of the "objectivity" of what they perceive to be the "best" evidence does not necessarily give adequate regard to the social context in which the evidence is to be used or the perspectives of the physicians and other health care professionals who are expected to use it. For example, Checkland *et al.* (2007) found that general practitioners (GPs) failed to implement evidence-based guidelines issued by the NHS. The reasons appeared to be related to the GPs' perceptions of their identity and role (their contexts) rather than the relevance or other characteristics of the guidelines themselves. GPs in one practice rationalized their failure to implement guidelines as being due to the number of documents received and lack of time. In this practice, however, GP identity was perceived in terms of doing clinical work. Management activities, including handling and acting on information received, were not regarded as legitimate work for GPs.

6.3.3 EBM and physicians' expertise and the doctor-patient relationship

6.3.3.1 The criticism

Early critics of EBM suggested that it amounted to a "cookbook" approach to medicine whereby physicians would lose their freedom to choose treatments for their patients: "Some fear that 'cookbook medicine' will reduce doctors' self respect and could reduce patients' confidence in them. Some critics of guidelines believe that clinical freedom, like other sorts of freedom, cannot be limited without being lost" (Delamothe, 1993). The normative nature of EBM and its claim to involve the "best research evidence" is perceived by some clinicians as diminishing the value of their experience and undermining their autonomy (Straus and McAlister, 2000; Tracy *et al.*, 2003). As one physician commented when asked about EBM in practice, "The guidelines will only take you so far ... each individual case has so many factors at play beyond what the guidelines cover and that's where the art and the pleasure of medicine comes in using your clinical judgement to realize that what the protocol says doesn't apply to that person or it applies in a different way" (Tracy *et al.*, 2003).

Charlton and Miles (1998) consider the place of clinical expertise and suggest that in EBM the expertise of the physician is secondary in importance to the evidence provided by external reviewers: "The misplaced emphasis on large databases as offering best guidance for clinical practice leads on to an implicit belief in the primary role of information and statistics. Consequently, the nature of clinical expertise has been redefined by EBM. It has traditionally been assumed that the best people for deciding upon clinical matters are those with clinical training, experience and a substantive knowledge of health and disease that ideally includes having performed research in the field. Such experts are usually doctors. But EBM regards clinical expertise as mainly a matter of collecting, analysing and summarizing research done by other people. Hence the final arbiters of EBM practice are 'systematic reviewers' drawn from biostatistics, epidemiology, health economics and other 'Infostat' disciplines" (Charlton and Miles, 1998)

Similar criticisms have been voiced in more extreme language by Holmes *et al.* (2006), who assert that "the evidence-based movement in health sciences constitutes a good example of microfascism at play in the contemporary scientific arena." In their opinion "EBM is akin to a totalitarian political structure and … its

way-of-seeing is informed by a politically dangerous ideology" (Murray et al 2008). Their view is that EBM imposes a rigid way of thinking and working and that it "denigrates other forms of knowledge [other than quantitative evidence], including clinician experience and patient testimony". They allege that EBM "is frequently used to justify state demands to streamline healthcare because … EBM provides ready-made and easy-to-implement numerical goals and targets." Porter and O'Halloran (2009) deprecate the rhetoric used by Holmes and colleagues and the heated nature of the debate they have generated but agree with them about EBM's "hierarchical and exclusivist approach to knowledge" which "excludes other forms of evidence that are needed to understand the complexity of care ... marginalizes important aspects of clinical knowledge, and ... fails to take account of individuals or their experience".

Although clinicians when practising EBM are meant to take into account patient values, preferences, concerns and expectations, there is a common perception in the UK that EBM as promulgated by NICE restricts the availability of medicines within the NHS. Headlines such as the following appear in the press: "Why can't we have this drug? Anger as cancer medication that saves thousands remains banned in UK" (Sophie Borland, Daily Mail, 24 August 2010). Although such claims may be misleading (Ben Goldacre, Guardian, 28 August 2010), part of the remit of NICE is to ensure that medicines are cost-effective (Secretary of State for Health, 2005), which means that patients' preferences cannot always be accommodated. In Goldacre's words, "Rationing healthcare resources is a soul-destroying and unavoidable horror" (Ben Goldacre, Guardian, 28 August 2010).

6.3.3.2 The counter-argument

It is true that advocates of EBM initially focused particularly on the key importance of evidence. The seminal paper by the Evidence-Based Medicine Working Group (1992) stated: "Evidence-based medicine de-emphasizes intuition, unsystematic clinical experience, and pathophysiologic rationale as sufficient grounds for clinical decision making and stresses the examination of evidence from clinical research." However, leading practitioners of EBM subsequently made it clear that far from being a restrictive, "cookbook" approach to medicine, EBM requires the clinician to use his or her expertise as well as relevant evidence: "Because it requires a bottom up approach that integrates the best external evidence with individual clinical expertise and patients' choice, it cannot result in slavish, cookbook approaches to

individual patient care" (Sackett *et al.*, 1996). As Straus and McAlister (2000) point out, this is clear from step 4 of the five-step approach to EBM specified above (section 6.2). The importance of taking into account the needs of the individual patient has also been stressed: "In recent years, EBM proponents have placed increasing emphasis on the assessment of the quality of life and the role of patient values in decision-making, thus allowing the use of private evidence in scientific reasoning and decision-making" Djulbegovic *et al.* (2009).

6.3.3.3 The perspective from the ISCM

These criticisms of EBM once again demonstrate the influence of the different contexts of the information user and the provider on information behaviour as shown in the ISCM. Although EBM does not amount to "cookbook" medicine, its practice does involve some restriction in clinical freedom to ensure that treatment decisions are supported by good evidence. From the context of a provider such as NICE the goal is to influence physicians to treat their patients in accordance with EBM guidance and evidence from clinical trials. Although EBM acknowledges the place of clinical expertise and patient values, in practice it places limitations on them by mandating preferred treatment pathways and "rationing" resources. From the physician's context when treating a particular patient, the evidence from clinical trials may not be perceived to have great relevance or utility for a patient who is different in terms of age, severity of symptoms, concomitant illnesses or medication or other clinical features compared with those in the trials (Feinstein and Horwitz, 1997). In such circumstances, the physician's treatment decisions and actions are likely to be influenced more by the particular context – the relationship with the patient and the patient's particular needs and wants – than by evidence and guidelines issued by NICE or other providers (Freeman and Sweeney, 2001). Moreover, the physician's personal context – his or her professional experience – plays a key role in decisions (Freeman and Sweeney, 2001) as suggested by the ISCM. Thus as may be predicted by using the ISCM to examine information behaviour and consequent decisions and actions, disparities between the context of the physician and the evidence provider such as NICE help to explain why EBM is not always put into practice in the way envisaged by its supporters.

6.3.4   Limited usefulness of EBM in the treatment of individual patients

6.3.4.1 The criticism

The criticisms about the relevance or utility of evidence from clinical trials to individual patients follow similar arguments to those already discussed. Kenny (1997) states the situation as follows: "Science, as it is generally understood, and clinical practice move in opposite directions. Science moves from individual observations to generalizable theories and laws. Clinical practice brings this generalized body of knowledge to bear to benefit an individual ... Clinical practice interprets the hoped-for benefits and potential harms discovered through science for a particular patient. This interpretation is an essential component of the clinical judgement that is central to practice." Kenny cautions that "It is a leap of faith to expand the results of a trial to a broad therapeutic principle. Clinicians recognize this instinctively. The best drug, the optimal dose and duration of therapy for a particular patient are not determined directly by a study involving a large population."

Cohn (1996) suggests that the application of evidence from clinical trials to the treatment of an individual patient raises three questions: "(1) Is the trial patient the same as the office patient? (2) Should one anticipate the same treatment response in all patients? (3) Is the endpoint in the trial the same as one seeks in practice?" Cohn agrees with the importance of evidence in informing clinical decision-making but cautions: "it is a mistake to conclude that megatrial data leading to probability-based care provide individual patients with optimal management." He concludes that "Evidence-based medicine ... may not yet be the solution to enhancing patient care its proponents claim. The diagnostic categories we squeeze patients into, the therapies we administer with the perception of homogeneity, and the endpoints we choose for convenience disregard the individual differences that have always driven the doctor-patient relationship."

Shackelton *et al.* (2009) question the value of EBM guidelines in the management of patients and suggest that they may reduce medical practice to a formulaic approach. They comment that before such guidelines were developed, "Clinical decision making was considered a somewhat metaphysical activity, perhaps even an art, which required special professional judgement based on unique experience and the particular circumstances of the presenting case. Doctors could manage the case in the way they deemed most clinically and professionally appropriate. Clinical

guidelines changed this dramatically by promulgating generally accepted 'gold standards', lists of what doctors ought to do and against which everyday clinical performance could be evaluated".

6.3.4.2 The counter-argument

Straus and McAlister (2000) regard the suggestion that EBM ignores the circumstances of individual patients as a misperception. Step 4 of the five-step approach is again relevant, with its requirement that "the patient's unique biology, values and circumstances" must be taken into account. Djulbegovic et al. (2009) note that "In recent years, EBM proponents have placed increasing emphasis on the assessment of the quality of life and the role of patient values in decision-making, thus allowing the use of private evidence in scientific reasoning and decision-making".

It is true that the applicability of evidence from a clinical trial to an individual patient may be questioned if he or she differs significantly from the patients in the trial in terms of age, concomitant illnesses or other clinical features. However, a key step in the practice of EBM, as described by Straus *et al.* (2011) in *Evidence-Based Medicine: How to practice and teach it*, is to ask the question: "Are the valid, important results of this individual study applicable to our patient?" To answer this, four further questions are asked:

1. Is our patient so different from those in the study that its results cannot apply?
2. Is the treatment feasible in our setting?
3. What are our patient's potential benefits and harms from the therapy?
4. What are our patient's values and expectations for both the outcome we are trying to prevent and the treatment we are offering?

Straus *et al.* describe ways in which a physician may set about answering these questions to try to ensure that the treatment decision meets the patient's needs and circumstances.

6.3.4.3 The perspective from the ISCM

The criticisms of EBM outlined above do not give a complete picture and need to be balanced by consideration of the steps involved in the practice of EBM put forward

by its advocates. Nevertheless, on the basis of the ISCM it would be expected that in a busy working environment contextual factors would influence a physician's information behaviour when treating an individual patient. Such factors include work pressures and time constraints, which may limit the feasibility of carrying out analyses of clinical trials and assessing the applicability of their findings to a particular patient in the ways suggested by Straus *et al.* (2011). The ISCM also suggests that the physician's personal context – knowledge, experience and ability – will influence his/her judgement: "Judgement is central to clinical practice ... Clinical judgement is poorly understood. In principle, physicians use logical, linear reasoning in diagnosis, prognosis and recommendation of treatments. In reality, this straightforward, logical process is the exception. Studies of clinical judgement confirm that practice is essentially pattern recognition, the use of heuristics or "rules of thumb," and value judgement" (Kenny, 1997).

These criticisms from the literature again illustrate that the ISCM highlights factors that can affect the implementation of EBM.

6.3.5   Lack of evidence that EBM improves patient outcomes

6.3.5.1 The criticism

Cohen *et al.* (2004) and other commentators (Djulbegovic *et al.*, 2009; Gupta, 2003; Norman, 1999) refer to the lack of hard evidence that EBM is more effective in patient treatment than health care that is not governed by EBM principles and guidelines. "EBM assumes that it will improve the quality of health care ... Considering that EBM focuses on basing patient care on statistically valid clinical trials, it is somewhat surprising and ironic to find that there is no evidence (as defined by EBM) to back up this underlying assumption" (Cohen *et al.*, 2004).

In a study of primary care physicians, Shackelton *et al.* (2009) found that clinical guidelines intended to standardize diabetes care had no significant effect in reducing the disparities in treatment that exist between patients with higher and lower socio-economic status. In their view, following guidelines is not in the interests of every patient: "We suggest that guidelines essentially create a formula by which any patient with a particular condition should be managed, thereby eliminating consideration of the peculiarities of a case and discouraging particularistic decision making."

Horsley *et al.* (2011) carried out a systematic review of studies that investigated the effects on patient care of teaching critical appraisal skills to health professionals. Critical appraisal is a fundamental element of EBM and constitutes step 3 of the five-step approach described by Straus *et al.* (2011) and outlined in section 6.2 above. They found that "teaching critical appraisal skills to health professionals may improve their knowledge. However, there was a lack of good quality evidence as to whether teaching critical appraisal skills led to changes in the process of care or to changes in patient outcomes" (Horsley *et al.*, 2011).

Referring to "the lack of good evidence that teaching EBM improves the quality of medical education or the subsequent care of patients", Tonelli (2006) commented that the widespread adoption of EBM in medical education "promises to alter the way that the next generation of doctors practise clinical medicine, yet it is not clear whether such a change will ultimately benefit patients".

Responding to criticisms of EBM, Djulbegovic *et al.* (2009) concede that "appealing normative features of EBM are yet to be translated into actual empirical proofs that the practice of EBM will have a favourable impact on patient outcomes. Such proofs are unlikely to arise; the best EBM will ever do is demonstrate that the application of its principles leads to practices that are consistent with the best available evidence (where best is determined by EBM principles)."

6.3.5.2 The counter-argument

It would be difficult to set up a rigorous study to provide convincing evidence of the clinical benefits of the EBM approach. Referring to the problems of carrying out a randomized trial to do this, Straus and McAlister (2000) comment that "no investigative team has yet overcome the problems of sample size, contamination and blinding that such a trial raises. Moreover, it is questionable whether withholding access to evidence from the control arm in such a trial would be ethical." They point out, however, that "outcomes researchers consistently document that patients who receive proven efficacious therapies have better outcomes than those who do not". There is much evidence from clinical trials to support this point, though it fails to take into consideration the arguments outlined in 6.3.4 above that question the applicability of the findings from clinical trials to an individual patient being treated by a physician.

6.3.5.3 The perspective from the ISCM

The ISCM provides a perspective on aspects of information behaviour relevant to these arguments. The model shows the influence of goals and of perceptions on information behaviour. Those of an information provider may of course differ from those of a user. On one side, the advocates of EBM and providers of EBM information sources and guidance, such as NICE, have a particular perception of what constitutes the best evidence about clinical treatment: evidence derived from well-designed clinical trials. However, as they concede (Djulbegovic *et al*., 2009; Straus and McAlister, 2000), there is no such evidence to prove that treatment based on EBM principles improves patient outcomes. Despite this paradox, their perception of what is the best evidence leads them to produce information and guidance with the goal of influencing physicians' clinical actions and decision making so that they are based on this evidence. On the other side, physicians have a primary goal of treating individual patients according to their specific needs. As users of information provided by NICE and others, physicians may not perceive evidence about medicines from clinical trials as having adequate utility or relevance for a particular patient. Again the ISCM highlights factors that affect EBM and its implementation.

6.3.6   Discussion

In considering these criticisms of evidence-based medicine, the ISCM has been shown to have practical value. The insights that it provides into information behaviour and the factors affecting it show why physicians' clinical practice may not follow the EBM approach recommended by its advocates.   Of fundamental importance are the different contexts of physicians and EBM information providers and the contextual factors described in the ISCM. Their needs, goals and perceptions differ and, in particular, physicians' perceptions of what constitutes the "best" evidence may be quite different from the perception of a provider such as NICE. The utility of evidence – its relevance to the particular patient being treated – is a key criterion for a physician, and guidelines and other evidence may not be perceived to have high utility. Although EBM calls for the integration of physicians' clinical expertise and patients' circumstances with evidence, clinical guidelines mandate preferred treatment pathways and may therefore be perceived to restrict treatment decisions.

6.4　Using the ISCM to guide information behaviour in the context of EBM

This research set out to develop a model of practical value that could be used to analyse and to guide information behaviour in the context of EBM. The previous discussion has shown the value of the ISCM in analysing the way in which EBM is practised and in highlighting reasons why it may not achieve the ideal put forward by its proponents. The following discussion considers the information behaviour of physicians, pharmaceutical companies and NICE in the context of EBM, using the ISCM to identify ways in which they might alter their behaviour the better to achieve their goals.

A fundamental feature of information behaviour that the ISCM highlights is the influence of context on the perceptions and activities of both information users and providers. This is true of physicians, pharmaceutical companies and NICE: all have their own, different perspectives on EBM. According to the definition quoted earlier (Sackett *et al.*, 2000), EBM involves the integration of three components:

- the best research evidence;
- clinical expertise; and
- patient values.

NICE focuses in particular on the first component: "NICE guidance supports healthcare professionals and others to make sure that the care they provide is of the best possible quality and offers the best value for money ... Our recommendations are based on the best available evidence of the most effective care" (http://www.nice.org.uk/aboutnice/). In the case of medicines NICE suggests that the "best available evidence" derives from randomized controlled clinical trials and systematic reviews of trials (National Institute for Health and Clinical Excellence, 2008). The focus on "best value for money" relates to the context of NICE as a body within the NHS that has a remit from government to ensure that medicines are cost-effective.

Physicians, on the other hand, may perceive the other two components of the definition to be more important – that evidence from their own experience and from patients about their particular circumstances outweighs the value of evidence from clinical trials. To quote again the physician interviewed by Tracy *et al.* (2003):

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"guidelines will only take you so far ... each individual case has so many factors at play beyond what the guidelines cover and that's where the art and the pleasure of medicine comes in using your clinical judgement to realize that what the protocol says doesn't apply to that person or it applies in a different way."

The context and perceptions of pharmaceutical companies are different again. As they have a commercial goal to sell their medicines for profit, it may be thought that their activities are incompatible with the principles of EBM. In the interviews with staff from companies reported in Chapter 5 they acknowledged that information they provide to physicians may be biased or slanted towards their own medical products but they perceived it still to be accurate and credible. Companies recognize the importance of EBM in the NHS and believe that they have an important role to play as providers of credible evidence. As one interviewee put it: "If I'm building a source of information which I want customers to feel ... is trustworthy and credible etc, I think the first point I would look at is any information that's on there has to be fair and balanced and that's warts and all. So we need to be really clear as to what the data is telling us, what the clinical evidence, the evidence base is telling us and the interpretation of that evidence base by ... important sources of information for GPs such as Cochrane, NICE ..." (extract B93).

These different perspectives mean that each of these groups may learn something different from the ISCM about information behaviour in the context of EBM.

6.4.1 Physicians

Figure 30 is a representation of the ISCM. The elements shown in green represent an information seeker, his/her information activities and the factors affecting them. The elements in blue represent an information provider, the provider's activities and the factors affecting them.
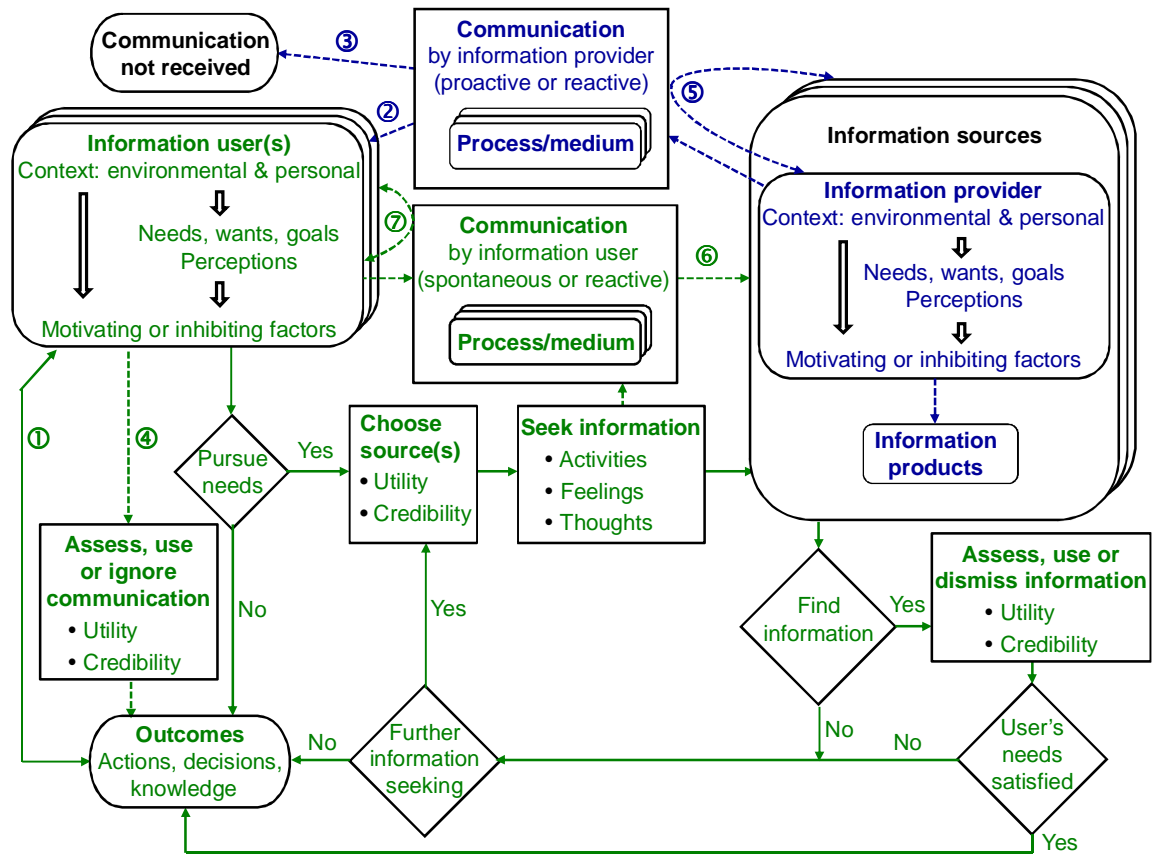
Figure 30: The ISCM – activities of the information seeker (green) and provider (blue)

By considering the information-seeking pathway shown in green in the model, practical recommendations may be made to physicians who wish to improve their information behaviour:

- Focusing on the "Choose information source(s)" and "Assess, use or dismiss/ignore information" boxes, a physician who decides to seek information about the best way of managing a patient first chooses appropriate source(s) to use and may then appraise the information found. The utility of a source that is easy to use and readily available may influence the physician to use it. For example, the findings in Chapter 4 revealed that many physicians use Google because of its high utility including ease of use, speed and convenience (Hughes *et al.,* 2010; Sim *et al*., 2008) despite the fact that it may yield information of inconsistent or poor quality (Falagas *et al*., 2008; Taubert, 2006). Physicians also obtain information from pharmaceutical companies' sales representatives despite having reservations about the credibility of the information (McGettigan *et al*., 2001). The model suggests that a physician who

wants to find the most appropriate information should consider which source or information is the most credible and should not be influenced to use information simply because of its convenience. To help physicians judge the credibility of sources and the information they provide, a recommendation would be for them to obtain training in critical appraisal skills. Such training is provided by various bodies including the Centre for Evidence Based Medicine at Oxford University (http://www.cebm.net/) and CASP UK (the Critical Appraisal Skills Programme: http://www.casp-uk.net/).

- Because physicians are busy, it is unrealistic to expect that they would have time to assess methodically the credibility of all the information they need and so they may have to rely on sources that they perceive to be credible. In this regard the ISCM suggests that they should recognize the differences between the context of an information provider such as NICE and their own. Thus they should ensure that in clinical practice they give due weight to the importance of the second and third components of EBM as defined by Sackett *et al.* (2000) – their own experience and their patients' circumstances. Where necessary they should question NICE or other guidance if it does not in their judgement meet their patients' needs even though NICE perceives it to be based on the best evidence.

- Focusing on the "Seek information" box, another recommendation would be for physicians to obtain training in searching techniques. An easily accessible way of doing this is through the widely used medical literature database system, PubMed, which provides helpful online tutorials that can improve users' searching skills (http://www.nlm.nih.gov/bsd/disted/pubmed.htm). Information providers that want physicians to use information sources that they provide should offer user-friendly training, perhaps similar to the tutorials on PubMed.

6.4.2   Pharmaceutical companies

If companies wish to increase the chance that physicians use the information that they provide, the model suggests that they should focus on its credibility as perceived by physicians (Figure 30 shows utility and credibility in green, emphasizing the fact that it is the perception of the information user that is important). It may be difficult to change physicians' views about advertising as an information source but companies could make them aware of the non-promotional

information services that they offer. Most companies have medical information departments that have the responsibility of answering requests from health care professionals (Robson and Riggins, 2001) but it is doubtful that many physicians are aware of them and how their role differs from those of the companies' sales and marketing departments. Increasing numbers of companies now recognize the value of such a service and are introducing the relatively new role of medical science liaison specialist, involving staff who visit health care professionals to provide non-promotional information and to answer questions (http://www.msla.org.uk/). Such services must demonstrate their credibility – their trustworthiness and reliability – by operating to high standards such as those set out in the ABPI Code of Practice for the Pharmaceutical Industry (http://www.pmcpa.org.uk/thecode/). Further dialogue with health care professionals and the NHS, as described in the Royal College of Physicians report *Innovating for health: patients, physicians, the pharmaceutical industry and the NHS* (Royal College of Physicians, 2009), may help the industry to provide information that better meets the credibility criteria of physicians.

6.4.3 NICE

NICE perceives itself, and is widely perceived, as being a trustworthy source of clinical guidance based on credible evidence. However, the ISCM suggests that an information provider should consider the utility of its information products as well as their credibility. In the interviews with NICE staff they admitted that the information products and communications that the organization sends to physicians and others are often perceived to be of poor utility in that they are lengthy and not tailored to the needs of individual physicians. Attempts have been made to improve utility, notably by the development of the NHS Evidence website. Interviewees also indicated that research into users' needs is leading to changes to improve utility further. Such efforts to make its guidance more digestible should help to improve its impact.

Utility, however, also concerns the usefulness and relevance of information. Making guidance from NICE more easily accessible or readable will not affect physicians' perceptions of its possibly low relevance to their needs when treating individual patients. Because of the normative nature of EBM in the NHS, a mismatch is likely to remain between the goals of information providers such as NICE in trying to influence physicians and the needs and goals of those physicians and their patients.

6.5   Conclusions

This analysis guided by the ISCM raises issues about the practice of EBM in the UK. It is not, and is unlikely to become, the logical step-by-step approach put forward by proponents such as Straus *et al.* (2011). The ISCM shows that information behaviour is complex. It is fundamentally influenced by the context of the information actor concerned. The context of a physician, dealing with an individual patient with particular needs, is different from that of NICE, which some perceive to be an "ivory tower" and which focuses on treatment guidance based on the typical patient seen in clinical trials rather than individual patients with their unique circumstances. The pharmaceutical industry plays an important role in EBM in that it is responsible for most of the clinical trials of medicines but because of the industry's commercial goals the perceived credibility of information that it disseminates about its medicines is lower than that from "independent" sources such as NICE. All information actors involved in EBM may benefit by considering what the ISCM reveals about information behaviour – their own and that of other actors. Physicians may benefit from training to improve their skills in searching for and assessing information. Pharmaceutical companies may benefit by making physicians aware of the non-promotional information they provide and ensuring that such services provide information that meets high standards of trustworthiness. NICE may benefit by further improving the user-friendliness of its guidance and the ease of access to it through sources such as NHS Evidence.

The ISCM has been shown to be relevant to EBM, identifying factors of information behaviour that affect the practice of EBM and helping to explain why it may not be the logical step-by-step process suggested by its advocates. The model has also been found to be of practical use in identifying aspects of information behaviour on which information users (physicians) and providers (pharmaceutical companies and NICE) may wish to focus in order to achieve their goals.

Chapter 7

Discussion and conclusions

7.1   Introduction

The research presented in this thesis was stimulated in part by the proliferation of models and theories of information behaviour that have appeared over many years in the field of library and information science. Commentators have criticized the failure of LIS researchers to build on previous research (Vakkari, 2008; Wilson, T.D., 1999) and have questioned the practical value of research into information behaviour (Case, 2012, pages 370-371). Seeking to answer these criticisms and to extend the scope of LIS models by learning from those developed in the field of communication studies, the aim of this research was to develop and test a new model of information behaviour that

a) builds on existing theory and research findings,

b) is more comprehensive than previous models by explicitly taking into account both the information seeker and the communicator or information provider, and

c) has wide applicability.

This chapter (Section 7.2) provides an overview of the research and its findings in relation to the objectives and research questions set out in Chapter 1. It describes the contributions that it adds to existing knowledge (section 7.3) before considering the trustworthiness and limitations of the research (section 7.4) and areas for further research and possible applications of the new Information Seeking and Communication Model (section 7.5).

7.2   Research methods and findings

This study sought answers to the following research questions:

1. Can the features of information behaviour identified in existing models be used to construct a more comprehensive model that encompasses seeking, use and communication of information?

2. Is such a model valid and applicable to the behaviour of both information users and information providers?

3. Can such a model provide insights into information behaviour that are of practical value?

These questions were addressed in the following ways:

Models of information behaviour were identified from the library and information science literature and that of communication studies (Chapter 2). They included those that focus on information seeking and those that focus on communication. A number were selected for analysis on the basis that each contributed different perspectives or additional detail. From the analysis key features of information behaviour were identified and used in developing the new Information Seeking and Communication Model (Chapter 3). The new model encompasses seeking, use and communication of information and is more comprehensive than existing models. It thereby answers the first research question.

To test the model a novel approach was used. To investigate its relevance to information users, the literature on the information-seeking behaviour of physicians was first examined to determine how well concepts from the ISCM represent this behaviour (Chapter 4). Then five of the published reports were examined using deductive content analysis to investigate the model's validity more rigorously and to identify any features of information behaviour that are not adequately represented in it. To test the model's applicability to information providers, employees of a selection of pharmaceutical companies and staff working for NICE were interviewed and the interview transcripts were analysed, again using deductive content analysis (Chapter 5). The findings demonstrated that, with minor modifications, the model is valid and applicable to the information behaviour of both information users (physicians) and information providers (pharmaceutical companies and NICE). The findings therefore successfully answer the second research question.

To investigate the practical value of the model it was used to examine information behaviour in the practice of evidence-based medicine (Chapter 6). The ISCM reveals that the logical approach to EBM put forward by its advocates, with its focus on patient management that is based on the best evidence, fails to take account of important factors that affect information behaviour. It prompts questions about the recommended practice of EBM and who should decide on the appropriate sources and their credibility and utility. It suggests that the different contexts of physicians and EBM information providers such as NICE mean that they have different needs,

goals and perceptions and, in particular, different perceptions of what constitutes the "best" evidence. The type of empirical evidence perceived by NICE and other proponents of EBM as the best or most credible evidence may be perceived by physicians as having low utility. This may be because it does not seem relevant to the patients they are treating or because treatment based on that evidence requires resources that they do not have. The model thus highlights reasons why EBM is not always put into practice in the way envisaged by its supporters. It also offers insights into aspects of information behaviour which information users and providers may wish to consider in order to achieve their goals. Physicians, for example, may want to improve their information searching and appraisal skills. Pharmaceutical companies could make physicians more aware of the non-promotional information they provide, while NICE could further improve the utility of its guidance. In these ways the model has been shown to provide useful insights into information behaviour that can have practical value. The findings thereby answer the third research question.

By satisfactorily answering these three questions this research has achieved the objectives set out in Chapter 1:

1. To review existing models of information seeking and communication in order to understand the factors affecting information behaviour that they identify

2. To develop a new, more comprehensive model that takes into account what is known about information behaviour from these models

3. To test the new model by investigating how it applies to:
   – the information behaviour of physicians
   – communication to physicians by two major information providers: the pharmaceutical industry and the National Institute for Health and Care Excellence

4. From this empirical research to validate the model and identify any modifications that may be needed to improve its practical application

5. To use the model to gain insights into information behaviour in the context of EBM and identify ways in which this may be improved

In so doing the research has achieved its overall aim of building on existing theory and research findings to develop a new model of information behaviour that takes into account both information seekers and providers.

7.3 Research contributions

The work presented in this thesis contributes to knowledge of and research into information behaviour in a number of ways:

7.3.1 Building on previous research and models

The Information Seeking and Communication Model was developed by examining the elements of information behaviour identified in previous research and models. It makes an important contribution by using existing knowledge in this way and in addressing the criticism that research in library and information science often fails to build on previous research (Vakkari, 2008; Wilson, T.D., 1999). In doing so it also widens the scope of the study of information behaviour by learning from research and theory both from library and information science and from communication studies. This is the first time that a model of information behaviour has been developed by combining the features from a range of models from these two disciplines. The derivation of the ISCM by building on existing models, rather than attempting to create another information behaviour model *de novo*, is in line with Dillon's (2007) call for "a moratorium on further general models of information seeking".

7.3.2 A comprehensive model

Previous models of information behaviour in library and information science have focused primarily on the information user and most have been concerned with information seeking. Models developed in the field of communication studies have typically focused on the communicator and the effectiveness of the communication process. Few models have referred in any detail to both the information user and the provider. One of the most noteworthy exceptions is Maletzke's model (Figure 17) but it does not provide details of the information seeking process nor does it refer to the assessment and processing of information. The ISCM is more comprehensive than existing models and is unique in its analysis of information users and providers, information seeking, use and communication, and the factors affecting information behaviour.

7.3.3 Research method

The empirical research to investigate the validity of the ISCM used a novel method. Deductive content analysis has not been widely used in LIS studies and this is the first time that the technique has been used to analyse text from published reports as well as transcripts of interviews in order to validate a model of information behaviour. Deductive content analysis is well suited as a tool for testing models of behaviour and this research may encourage more widespread use.

7.3.4 Insights into information behaviour

The ISCM draws attention to issues that must be borne in mind if information behaviour is to be fully understood, including the following:

- Information seeking should not be considered in isolation from communication and vice versa
- Information users are also information providers and vice versa
  - Information behaviour can be highly interactive (Figure 26), with users communicating with other users (acting as providers) and sharing information
- Environmental and personal contexts strongly influence the information behaviour and perceptions of both the information user and provider
  - When examining information behaviour the differences between the user's context and that of the provider must be considered
  - Differences between the user's and provider's perceptions should also be considered including their perceptions of themselves and of each other
  - The provider may fail to understand the user's needs
- The utility and credibility of information and sources are key factors affecting the assessment and use of information
  - The user's and provider's perceptions of utility and credibility may differ (possibly markedly so)

The empirical research demonstrates not only the ISCM's validity but also its practical value in providing insights into the information behaviour both of information users and of information providers. Its application in analysing behaviour in evidence-based medicine illustrates and explains why clinical practice does not follow the logical step-by-step process proposed by EBM's advocates. The practical

usefulness of the model answers the criticism that information behaviour studies lack utility (Case, 2012, pages 370-371).

7.3.5   Endorsement of earlier models

A further important contribution of this research is that by demonstrating the validity of the ISCM it also provides evidence of the validity of the earlier models from which the ISCM was derived. Most of these models were not developed specifically for the field of health care (Gorman's model, Figure 3, is an obvious exception). By showing that the elements of information behaviour described in these models are applicable to health care the findings demonstrate their wider relevance.

7.3.6   Publication

This work has also contributed to the research literature. A paper describing the ISCM and the way in which it was developed has been published (Robson and Robinson, 2013) and this may stimulate interest in the model and its possible uses.

7.4   Trustworthiness and limitations of the research

Important strengths of this research are that the ISCM has been developed by building on and learning from previous research and existing models, and it has been shown to be of practical value. It is not meant only as an academic model – it is also intended to have wide applicability and to provide practical insights into information behaviour. The fact that its relevance has been demonstrated in health care, a different environment from those in which most of the precursor models were developed, is evidence of the wide applicability of the elements of information behaviour included in the model. Although broad in scope it does not aim to describe every aspect of information behaviour in detail but rather to depict major features which may then be analysed in more detail in each particular environment in which the model is used.

In order to judge the quality of the research it is essential to assess how trustworthy the findings are and to consider the limitations of the methods used. The following sections discuss these issues.

7.4.1 Trustworthiness of the findings

Lincoln and Guba (1985) proposed four criteria that have been widely used to assess the trustworthiness of qualitative research:

- *Credibility* refers to "the adequate representation of the constructions of the social world under study" (Bradley, 1993). It signifies the degree of confidence that may be placed in the analysis of the findings and the researcher's representation of them (Graneheim and Lundman, 2004).
- *Transferability* refers to the extent to which the findings can be applied to other contexts (Graneheim and Lundman, 2004).
- *Dependability* refers to "the coherence of the internal process ... and to the way the researcher accounts for changing conditions in the phenomena" (Bradley, 1993).
- *Confirmability* refers to "the extent to which the characteristics of the data, as posited by the researcher, can be confirmed by others who read or review the research results" (Bradley, 1993).

Aspects of the research methods that were intended to enhance the trustworthiness of the findings are discussed below in relation to each of these criteria.

7.4.1.1 Credibility

Strategies that may be employed to enhance credibility include triangulation, searching for negative cases and member checking (Bradley, 1993).

Patton (1990, page 187) describes triangulation as "the combination of methodologies in the study of the same phenomena or programs. This can mean using several kinds of methods or data". He refers to four types of triangulation originally put forward by Denzin (1978):

1. *data triangulation* – the use of a variety of data sources in a study;
2. *investigator triangulation* – the use of several different researchers or evaluators;
3. *theory triangulation* – the use of multiple perspectives to interpret a single set of data;
4. *methodological triangulation* – the use of multiple methods to study a single problem or program.

This research involved some data triangulation, using a number of different data sources. Findings were analysed from information users (physicians) and two groups of information providers (staff from pharmaceutical companies and NICE). The physicians' data came from studies carried out in the UK, Ireland, the USA and several other countries and involved both general practitioners or family physicians and hospital doctors. The data from pharmaceutical companies came from interviewees in large, medium and small companies with headquarters in the UK, Europe, the USA and Japan, including staff from different departments (medical and marketing). In addition to the findings on physicians' information behaviour that were obtained from the published reports, the interviews with staff from pharmaceutical companies and NICE provided further information about physicians' behaviour. The details obtained from pharmaceutical companies' staff about their information behaviour were supplemented by comments from NICE staff about companies' behaviour, and vice versa.

The research also involved methodological triangulation. In the study of physicians a literature review was carried out to assess the relevance of the ISCM to their information behaviour. Then deductive content analysis was used to analyse the findings of five studies in detail.

In developing a theoretical framework it is important to search for negative cases – any findings that do not fit the hypothesis, theory or model that has been put forward, so that it may be developed or rejected (Patton, 1990, page 463). In this research concepts identified in the content analysis that did not seem to fall within the coding terms derived from the ISCM were reviewed. They were found to be adequately covered by the concepts identified in the ISCM but minor modifications were made to the original diagrammatic form of the model to make it clearer.

Shenton (2004) refers to member checking as "the single most important provision that can be made to bolster a study's credibility". He describes it as follows: "Checks relating to the accuracy of the data may take place 'on the spot' in the course, and at the end, of the data collection dialogues. Informants may also be asked to read any transcripts of dialogues in which they have participated." In this research member checking was carried out during the interviews of staff at pharmaceutical companies and NICE by summary checks: at several points in an interview the researcher paraphrased what the interviewee had said and asked if his interpretation was

correct. Then after the interviews each interviewee received a copy of the transcript to check its accuracy.

7.4.1.2 Transferability

Bradley (1993) comments that judging how far the findings from qualitative research are applicable in a different context "can be made only by comparing the two contexts, the burden of which falls not on the researcher but on those who wish to make the comparison. The researcher's responsibility is to provide enough data, through rich, ample description, to allow these judgments to be made." To aid other researchers who may wish to carry out similar research or to investigate the use of the ISCM in different contexts, this thesis provides detailed information about the methods used and the data that were analysed, including:

- a description of the method of deductive content analysis and details of the code book used;
- details of the published reports used for the analysis of physicians' information behaviour, with quotations to illustrate the application of coding terms;
- details of the interview technique and copies of the interview guides;
- information about the interviewees and their roles;
- extensive extracts from the lengthy transcripts to give an adequate overview of their contents and to illustrate the application of coding terms.

With this "rich, ample description", readers should be in a position to judge the transferability of the findings to their own contexts.

7.4.1.3 Dependability

Dependability refers to consistency in the way in which a study is conducted. As Graneheim and Lundman (2004) note, "When data are extensive and the collection extends over time there is a risk of inconsistency during data collection." They add: "it is important to question the same areas for all the participants." In this study interview guides were used to ensure consistency in the interviews both with pharmaceutical companies and with NICE.

Shenton (2004) states that to indicate the degree of dependability of a study, "the processes within the study should be reported in detail, thereby enabling a future

researcher to repeat the work, if not necessarily to gain the same results." He suggests that the study report should include details of:

a) the research design and its implementation;

b) the operational detail of data gathering;

c) reflective appraisal of the project, evaluating the effectiveness of the research.

This thesis includes full details of the research design, how the study was carried out, how the data were obtained and analysed, and this chapter evaluates the trustworthiness of the findings. These details should enable other researchers to make informed judgements about the consistency of the methods and the dependability of the findings and, if they wish, to carry out a similar study.

7.4.1.4 Confirmability

To help ensure that the findings of a study can be confirmed by other researchers or readers, Shenton (2004) states that "steps must be taken to help ensure as far as possible that the work's findings are the result of the experiences and ideas of the informants, rather than the characteristics and preferences of the researcher." He refers to the role of triangulation in promoting confirmability, to reduce the effect of investigator bias. As noted above in section 7.4.1.1, this research involved some triangulation – of data and of methods.

Shenton also comments that "detailed methodological description enables the reader to determine how far the data and constructs emerging from it may be accepted." This may include an audit trail that shows "the course of the research step-by-step via the decisions made and procedures described". This thesis provides a detailed review of the precursor models from which the Information Seeking and Communication Model was developed. It provides details of the methods used in the empirical research, extensive extracts from the texts and interview transcripts analysed, copies of the interview guides and of the coding book used in the context analysis. Significant efforts have thus been made to enhance the confirmability of the findings.

7.4.1.5 Conclusions

Attempts have been made in the design of this research to ensure adequate standards in the methods used and to demonstrate the trustworthiness of the

findings and conclusions. It is for others to make their own judgements of the research's trustworthiness but it is hoped that sufficient detail has been provided in this thesis for them to do that. All research has shortcomings that impact on its trustworthiness, and limitations of this research are discussed in the following section.

7.4.2 Limitations

Part of the aim of this research was to develop a model that has wide applicability. The applicability and value of the ISCM has been tested in some depth in the field of health care and in the context of evidence-based medicine. It has been used to study both information users (physicians) and information providers of two kinds: the pharmaceutical industry and NICE. As noted already, in section 7.4, the fact that the model has been shown to be relevant in health care, which is a different environment from the contexts in which most of the other models were developed, is evidence of the wide applicability of the elements of information behaviour included in the model. It is impossible, however, to prove that the findings and conclusions from a qualitative investigation such as this are applicable to other situations and populations, and many naturalistic researchers believe that generalization from one environment to others is not possible since all observations are influenced by the contexts in which they occur (Shenton, 2004). Nevertheless the ISCM is adaptable to different environments. Terms such as "context", "needs, wants, goals", "perceptions" and "motivating or inhibiting factors" will all be determined with reference to the particular information users or providers being studied and the environments in which they operate.

Because of the very large number of existing models of information behaviour a limitation of this thesis is the fact that it has been feasible to review only a relatively small number of them. The aim in reviewing the models was to identify aspects of information behaviour of general applicability in order to develop the new model. It would be of value for scholars to produce a comprehensive review of models to add to the surveys that have been undertaken so far (Case, 2012; Fisher *et al.*, 2005; McQuail and Windahl, 1993).

The number of interviewees involved in this study was limited: 13 from pharmaceutical companies and five from NICE. The representativeness of the findings may therefore be questioned. However, the range of companies involved

was designed to be representative by including small, medium and large companies and to represent differing cultures by involving companies with headquarters in the UK, Europe, the USA and Japan. It had been hoped to include roughly equal numbers of interviewees from medical and marketing departments but of those who agreed to participate nine were from medical and four from marketing departments. However, all of the interviewees from medical departments provided insights into their companies' marketing objectives. The numbers of participants from companies and from NICE were judged to be adequate as the final interviewees in each case provided no further insights additional to those identified in earlier interviews.

Qualitative content analysis is a process that involves subjective interpretation by a researcher of the meaning of texts and how the concepts expressed may be categorized in a coding system. It is important that coding is performed in a consistent way. To facilitate this, the meaning of each coding term used must be clear and distinguishable from that of every other term. Ideally, the validity of coding should be established by showing that two or more coders consistently apply the same codes when coding the same text (Forman and Damschroder, 2008). In this research a code book was developed on the basis of the ISCM with clear definitions for each of the main terms used (section 4.3.1.1). Efforts were made to establish consistency in coding of the interview transcripts by comparison of coding between transcripts and by coding four of them twice at intervals of several months and comparing them. Because there was only one researcher, however, it was not possible to test how well the codes would be applied by different coders.

Using the deductive or directed approach to content analysis runs the risk that a researcher may be biased by the model or theory being investigated and may be more likely to find evidence that is supportive rather than non-supportive of it (Hsieh and Shannon, 2005). This possibility was anticipated in this research and if the meaning of any text did not seem to be covered by the codes derived from the ISCM a new term was added. When the new coding terms were subsequently reviewed the underlying concepts were found to be adequately represented by the existing codes. Examples are given in Chapter 5, section 5.5.7. The risk of bias in a study like this could perhaps be reduced by involving an auditor to review the coding terms and the way in which the text has been coded. The use of an auditor in this way, while arguably generally desirable, is problematic in the context of doctoral research, which is intrinsically an individual activity.

A limitation of any research into information behaviour is that it is a rapidly changing situation with new technology, tools and communication media appearing all the time. The environments of the information actors also change. The findings may therefore become outdated. In this research the findings on physicians' information behaviour were obtained from published literature, some of it dating back to before the widespread use of personal computers and the Internet and much of it predating the common use of social media. There is little reason to believe that the findings are not still representative of the environments within which physicians work, their information needs and perceptions and the factors that affect their information seeking. However, the ways in which they can find information are changing, as has been mentioned in this thesis in the context of NICE with its development of the NHS Evidence website and with regard to the increasing use of social media by physicians (Berben *et al.*, 2011; Chu *et al.*, 2010). The environments of the information providers are also changing. NICE changed its name to the National Institute for Health and Care Evidence from 1 April 2013, with a new structure and additional responsibilities for supporting social care. The pharmaceutical industry is also changing, with new approaches to information provision such as the services offered by medical science liaison specialists (http://www.msla.org.uk/). It is unclear how all these changes will affect information behaviour in health care in the UK. To demonstrate the continuing validity of the ISCM it would be worthwhile to use it for further research into information behaviour in health care.

7.5   Future research directions

The ISCM has been developed as a model of information behaviour that can be applied in different environments and it has been shown to be capable of providing insights into information behaviour in the practice of evidence-based medicine. To make practical use of the model, further possible research directions include the following:

- Expanding research with the ISCM in health care
- Testing the ISCM in other environments
- Testing the importance of credibility and utility in information behaviour

7.5.1   Expanding research with the ISCM in health care

Now that the validity of the ISCM has been demonstrated in the health care environment, it would be of value to expand this work. Further research into the

information behaviour of physicians would be worthwhile to augment the findings described in this thesis. In addition it would be of interest to use the model to examine the information behaviour of other professionals involved in health and care.

7.5.1.1 Physicians

In view of the rapid changes in information resources available to physicians and the increasing use of social media to find and share information (Berben *et al.*, 2011; Mansfield *et al.*, 2011), it would be appropriate to update the findings in this thesis by carrying out a further study of physicians' information behaviour using the ISCM. Such a study could investigate physicians' current use of information sources, their reasons for using them and their perceptions of the sources' credibility and utility. To do this, rating scales could be developed by which physicians would assess:

- Credibility – by giving scores for factors such as trustworthiness, accuracy, authority and bias (or lack of it)
- Utility – by giving scores for factors such as relevance, importance, accessibility and ease of use

The findings could then be put to practical use to suggest ways of improving the utility of sources that are underused or of raising physicians' awareness of such sources and their skills in using them.

7.5.1.2 Other health and care professionals

Pharmacists play an important role as information providers in the NHS, particularly in hospitals, and it would be of interest to use the model to investigate their information behaviour and their interactions with physicians and other health care professionals. Their use of information sources and their assessments of the sources' credibility and utility could be carried out in a similar way to that suggested for physicians. Again the findings could be used to suggest ways of improving the utility of sources that are underused.

The information behaviour of those involved in social care is another area of potential research interest, particularly in view of the increased role of NICE in providing support for social care. The ISCM could be used to examine factors affecting the use of information by social care providers and how they rate the

credibility and utility of information sources, including NICE. The findings could be of practical value to NICE and other information providers in developing services that meet the particular needs of social care professionals.

7.5.2 Testing the ISCM in other environments

To demonstrate the wider value of the ISCM it should also be used to investigate information behaviour in other environments. One area of potential interest to universities and other institutions that provide training in librarianship and information science is the information behaviour of information professionals. Through experience of running training courses for information officers in pharmaceutical companies, the author has gained the impression that they have less familiarity with some of the more traditional information sources and how to use them, notably bibliographic databases, than was the case some years ago. It would be worthwhile to identify the factors affecting the information seeking behaviour of such professionals – for example in industries such as pharmaceuticals, chemicals or oil – and the sources that they choose. It would also be of interest to investigate their clients' perceptions of the information products and services they receive from them. The ISCM would be a helpful tool to guide such research. The findings could be used to identify specific training needs of information officers and ways in which they could enhance their services in order to increase their utility or credibility for their clients.

7.5.3 Testing the importance of credibility and utility in information behaviour

The ISCM identifies the key importance of perceived credibility and utility in users' choice of information and sources and in their assessment and use of information. Further research to investigate factors that affect these perceptions would be worthwhile. The following proposal outlines one possible line of research.

The empirical research reported in Chapter 4 showed that information provided by NICE is generally seen to be highly credible but its utility does not always meet physicians' needs in terms of ease of use and relevance to their environmental context. The credibility of information from the pharmaceutical industry, on the other hand, is questioned but it has comparatively high utility in that it is provided in an easy-to-use form (for example, advertisements and brochures with concise

summaries of information). To investigate these factors further, it is proposed that information summaries be prepared for physicians about the use of particular medicines or the management of specific disorders. With the agreement of NICE, these could be adapted from existing NICE guidance – for example the guidance on the use of zanamivir and other antiviral agents for the treatment of influenza (http://publications.nice.org.uk/amantadine-oseltamivir-and-zanamivir-for-the-treatment-of-influenza-ta168), which was referred to in Chapter 6 (section 6.3.2). A summary version of this or other guidance would be prepared in a plain format, either as a printed Word document or as a web page, and it would be prominently stated that it originated from NICE. A second version of the document or web page would also be prepared, which would contain the same information but it would be designed in an attractive way with bold headlines and one or more visuals such as a photograph of a "patient" and a picture of a pack of Relenza (zanamivir). With the agreement of NICE and the relevant pharmaceutical company (GlaxoSmithKline) this version of the guidance would carry the company's name but not that of NICE. An alternative approach would be to generate a guidance document for a fictitious product, with help from a health care professional if necessary, and produce this in two formats as described.

A group of physicians or other health care professionals would then be asked to read one version of the document and to rate the credibility and the utility of the information and to give reasons for their views. A rating scale such as that mentioned above (section 7.5.1.1) could be used for this purpose. A second, similar group would be asked to read and rate the other version. The aim of the research would be to obtain further information about perceptions of credibility and utility, their relative importance and how they are affected by the way in which information is presented. The findings would be of potential value to NICE, pharmaceutical companies or other information providers, providing insights into ways of improving communications.

7.6   Final comments

This thesis provides a detailed overview of models of information behaviour, from which the new Information Seeking and Communication Model has been developed. The ISCM is more comprehensive in scope than previous models, covering information seeking, use and communication and factors affecting these activities. It is generic in nature with potential applicability in different environments. It has been

shown to be applicable to the information behaviour of physicians and to information provision by pharmaceutical companies and NICE. It has also been found to provide insights into information behaviour in evidence-based medicine, helping to explain why clinical practice does not necessarily conform to the process prescribed by EBM. The development and practical application of the ISCM answers criticisms that research in library and information science fails to build on the foundations of previous research and that information behaviour studies lack practical value. It is hoped that future research will take into account what the ISCM reveals about information behaviour.

Appendix

Content analysis code book

The initial set of concepts derived from the ISCM and the corresponding codes to be used in the content analyses are shown in the following table.

Concept	Code
Information	Inf
• Utility	Util
• Credibility	Cred
– homophily, heterophily	Hom/Het
Information user	User
• User's context	UCon
– Environmental	UEnv
– Personal	UPsnl
▪ demographics	UDem
▪ expertise	UExp
▪ psychological factors:	UPsy
• perceptions	UPer
• self-efficacy; ability to cope with stress	UStr
– Needs, wants, goals	UNWG
▪ motivating factors	UMF
▪ inhibiting factors	UIF
• Decision to seek information	DISeek
– Choosing information source(s) (utility, credibility)	ChSource
• Information seeking	ISeek
– searching (active, ongoing, passive)	ISearch
▪ activities	ISA
▪ thoughts	IST
▪ feelings	ISF

• Find information	Find
• Process information	IProc
– assess it (utility, credibility)	IAss
– use it	IUse
▪ take actions	Act
▪ make decisions	Dec
– ignore it	Ign
Information sources	Source
• Information products	Prod
• Information providers	Prov
– Provider's context	PCon
▪ Environmental	PEnv
▪ Personal	PPsnl
• expertise	PExp
• psychological factors	PPsy
o perceptions	PPer
– Needs, wants, goals	PNWG
▪ motivating factors	PMF
▪ inhibiting factors	PIF
Communication	Com
• proactive, spontaneous, reactive	Comp/Comr
• process	ComProc
• medium	ComMed
• one-way	Com1
• two-way	Com2

Many of the concepts are subsidiary to others and so a final code book was prepared with some of the above codes subsumed under broader codes. This is shown in the following table, with details of how each term or code was used.

Final code book			
Term	**Code**	**Used for**	**Subsumed codes**
Information	Inf	Information, data, content of an information product. Also used for information provided as guidance, advice or advocating a course of action.	
Utility	Util	Perceived usefulness, relevance, importance, timeliness, accessibility or ease of use of information or of a source.	
Credibility	Cred	Perceived trustworthiness, reliability, accuracy, objectivity, authority, completeness and lack of bias of information or of a source, homophily of a source. Heterophily = lower credibility. Bias = low credibility.	Hom, Het
User	User	May be an individual, group or organization that: – uses information e.g. to make a decision or take action – seeks information – has information needs – receives communications.	
User's context	UCon	The user's environmental and personal context, including demographics, living or working environment, resources and technology available, culture, job role, knowledge, expertise and psychological factors.	UEnv, UPsnl, UDem, UExp, UPsy, UStr

User's needs, wants, goals	UNWG	Personal or job-related information needs, desires or aims that may lead to information seeking.	
User's perceptions	UPer	Perceptions of self and self-efficacy, perception of a knowledge gap, perceptions of others including sources and information providers.	
User's motivating factors	UMF	Factors motivating a user to seek information.	
User's inhibiting factors	UIF	Factors inhibiting a user from seeking information.	
Sources	Source	General term covering information products, communication media or the providers of information (definitions below). These more specific terms are preferred when coding text.	
Provider	Prov	Individuals, groups and organizations that produce, supply or communicate information, or facilitate or control access to it.	
Provider's context	PCon	The provider's environmental and personal context including, where relevant: demographics, living or working environment, resources and technology, culture, job role, knowledge, expertise and psychological factors.	PEnv, PPsnl, PExp, PPsy
Provider's needs, wants, goals	PNWG	Personal, job-related or organizational information needs, desires or aims that may lead to production and dissemination of information.	

Provider's perceptions	PPer	Perceptions of an individual provider or an organization of itself, perceptions of others including users.	
Provider's motivating factors	PMF	Factors motivating a provider to communicate information.	
Provider's inhibiting factors	PIF	Factors inhibiting a provider from communicating information	
Information products	Prod	Literature, databases, websites, presentations, TV and radio programmes and other outputs from information providers.	
Communication	Com	The process of communicating, disseminating or sharing information by an information provider or by a user. One-way, two-way, multidirectional or broadcast communication.	Comp, Comr, ComProc, Com1, Com2
Communication medium	ComMed	The medium or channel through which information is communicated, e.g. the Internet, traditional publishing, mass media.	
Choose source	ChSource	A user's decision about which information source(s) to use when searching for information.	
Seek/search for information	ISeek	Decision to seek information. Wilson's concepts of active, ongoing and passive search. The activities involved in seeking information – e.g. using a search engine to search the Internet, using a database such as PubMed, or asking a question of a colleague or other source.	DISeek, ISearch, ISA

Feelings and thoughts	ISF/IST	Feelings and thoughts when seeking information such as those represented in Kuhlthau's model	
Find information	Find	Finding information as a result of information seeking	
Assess/Process information	IProc	Analysing, evaluating, interpreting and organizing information found by searching or received through communication. This refers to a user of information but may also apply to a provider, in which case the provider is also a user using information in order, for example, to produce an information product.	IAss
Information use:	IUse	Using information – for example, to:	
• Act/decide	Act/Dec	Take action or make a decision on the basis of the information.	
• Produce information products	Prod	Produce information in printed, electronic or other form (use the term "information products" as above)	
• Communicate	Com	Disseminate or share information (use the term "communication" as above)	
Information non-use	Ign	Ignoring information or dismissing information received or found	

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