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Building on models of information behaviour: linking information seeking and communication

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Abstract

Purpose – This paper seeks to gain insights from existing models of information behaviour, building on them to develop a new model which, unlike most others, encompasses both information seeking and communication. By identifying key factors affecting the successful communication and use of information, it is hoped that the model will be of practical value to both information providers and users.

Design/methodology/approach – The paper is based on a literature search and analysis of well-established models of information seeking and of communication, from which a new conceptual model is constructed.

Findings – Existing models have elements in common, though most models in library and information science focus on information seeking and the information user, while those from the field of communications focus on the communicator and the communication process. A new model is proposed that includes key elements of existing models and takes into account not just the information seeker but also the communicator or information provider.

Originality/value – The model developed in this paper is the first to combine elements from both information seeking and communication models. Being built on previous research, it can be used to investigate the practical value of the model itself and the elements that it has in common with other models.

Keywords – Information behaviour, Communication, Theory, Models

Paper type – Research paper

Introduction

Human behaviour in finding, using and communicating information is complex. Much research has been carried out in this field and many theories and models of information and communication behaviour have been developed (Fisher *et al.*, 2005; Case, 2007; McQuail and Windahl, 1993). Many of the theoretical frameworks developed by library and information science (LIS) scholars focus on information-seeking activities, but information behaviour in its widest sense also includes communication and provision of information. Thus Ingwersen and Järvelin (2005, p. 259) define information behaviour as "generation, acquisition, management, use and communication of information, and information seeking". Theory and models developed in communication studies (Windahl *et al.*, 2009) can add further insights to those from library and information science in our understanding of information behaviour.

This paper examines a number of well established models. As well as those that focus on information seeking, others that explicitly refer to communication are included in order to give a wider perspective of information behaviour. A new model is presented that captures key elements of existing models and provides more detail about communication as an aspect of information behaviour.

Theory in information behaviour

Vakkari and Kuokkanen (1997) note that "Growth of knowledge means growth of scientific theories", and that theory grows by building on and developing earlier theory. In the field of information behaviour, a wide variety of theoretical frameworks have been developed but there has been no consensus on what is meant by theory (Case, 2007), or whether the term "theory" itself is appropriate (Dervin, 1991).

Pettigrew and McKechnie (2001) cite at least ten definitions of theory, 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". They investigated the extent to which theory is used in information science research by examining 1,160 articles published in six LIS journals between 1993 and 1998. They 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, which originated from library and information science, the social sciences, the humanities and the sciences. It is clear, however, that some were referred to in very general terms, since they included broad concepts such as graph theory, Newtonian physics, probability theory and postmodernism. One hundred and eighty of the cited theories were attributed to LIS authors, and 84 of the articles proposed new theories. The fact that such a large number of theories or frameworks have been developed in the LIS discipline (and bearing in mind that these findings were from just six journals covering the years 1993 to 1998), 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.

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 (2007) calls a "history of complaint" about the quality of research in LIS, with weaknesses in theory and a failure to build on existing theory.

In 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 the fact 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.

Models of information behaviour

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".

Many models have been developed that attempt to describe information behaviour. Those developed by LIS scholars tend to focus on information seeking rather than other aspects of information 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, 2006). 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. A number of models of information-seeking behaviour will be reviewed here before considering the larger picture of information behaviour, which includes communication.

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).

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. As such it does not include the role and activities of information providers. Nor does it consider the individual's information needs or the context, such as work environment, in which those needs arise.

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, of students (Hyldegård, 2006, 2009; Kuhlthau *et al.*, 2008), lawyers (Kuhlthau and Tama, 2001) and a securities analyst (Kuhlthau, 1999).

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.

Stages in ISP	Feelings Common to Each Stage	Thoughts Common to Each Stage	Actions Common to Each Stage	Appropriate Task According to Kuhlthau Model
1. Initiation	Uncertainty	General/vague	Seeking Background Information	Recognize
2. Selection	Optimism			Identify
3. Exploration	Confusion/Frustration/Doubt		Seeking Relevant Information	Investigate
4. Formulation	Clarity	Narrowed/Clearer		Formulate
5. Collection	Sense of Direction/Confidence	Increased Interest	Seeking Relevant or Focused Information	Gather
6. Presentation	Relief/Satisfaction or Disappointment	Clearer or Focused		Complete

Table 1. Kuhlthau's Information Search Process (ISP), Kuhlthau CC, 1991
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The ISP model, like that of Ellis, does not include the role of information providers, nor does it consider the individual's information needs or the context in which they arise.

Leckie model

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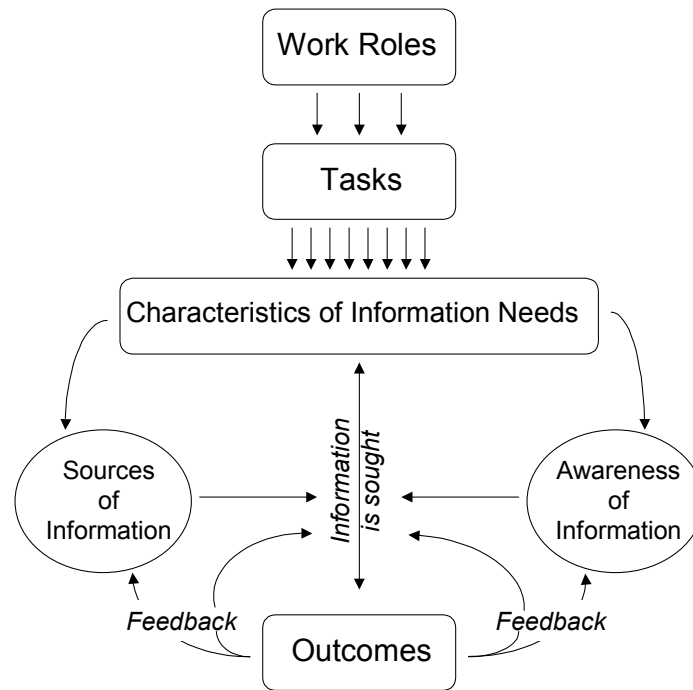
Figure 1. A model of the information seeking of professionals, Leckie GJ *et al.* 1996
(© 1996 The University of Chicago)

This model is based on the authors' review of research into information-seeking behaviour by three professional groups: engineers; healthcare 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. It has subsequently been employed in a number of studies of information behaviour, including that of lawyers (Wilkinson, 2001), engineers (Kwasitsu, 2003), engineering and law students (Kerins, 2004) and dentists (Landry, 2006). 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 specific groups. 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."

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, p. 170). Johnson sets 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).
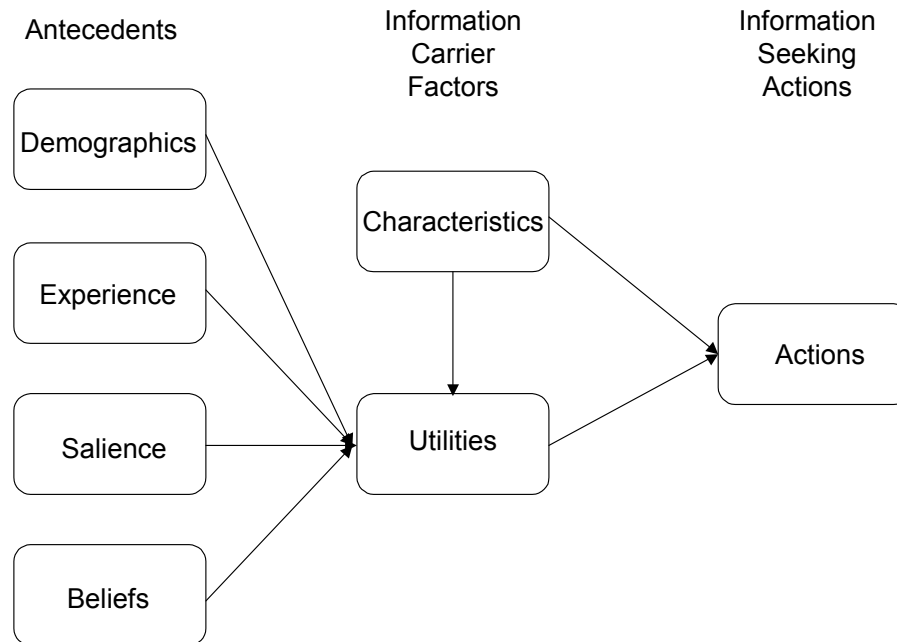
7

Figure 2. Comprehensive model of information seeking (Johnson *et al.*, 2001)
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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;
- beliefs – the information seeker's beliefs about the subject area and about his or her abilities.

Johnson's concept of salience as an antecedent needs clarification. The salience of information – its significance and applicability – can of course be assessed only after it has been found. 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.

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 the user's perception of their credibility and authority, and the accuracy and 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, p. 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 plays a key part in 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, p. 111).

The CMIS was developed as a model of information seeking by patients and others affected by cancer. It has been tested primarily in this context but its basic principles are of more general applicability, and it has for example been used to investigate information seeking by engineers (Johnson, 1997, p. 106).

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:
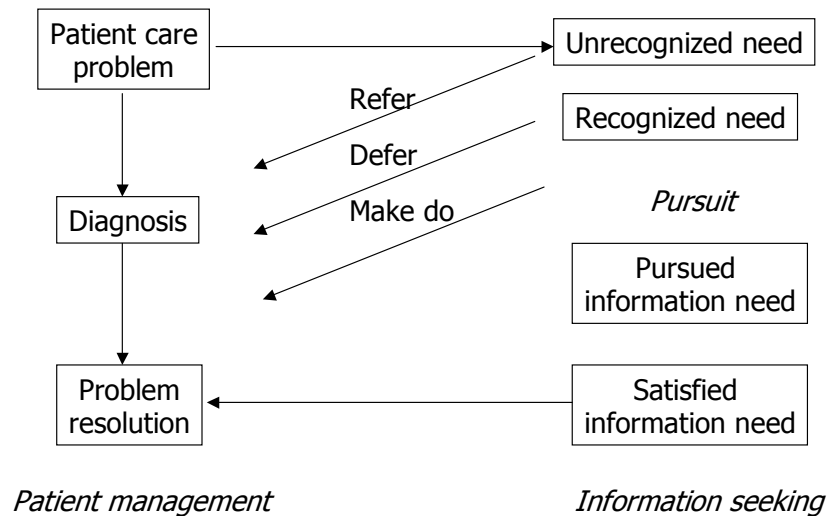

Figure 3. Information seeking in primary care (Gorman P, 1999)

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/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.

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.

Ingwersen and Järvelin model

The models discussed so far focus primarily on information seeking. In their cognitive model (Figure 4), Ingwersen and Järvelin (2005) also refer to communication.

= Cognitive transformation and influence
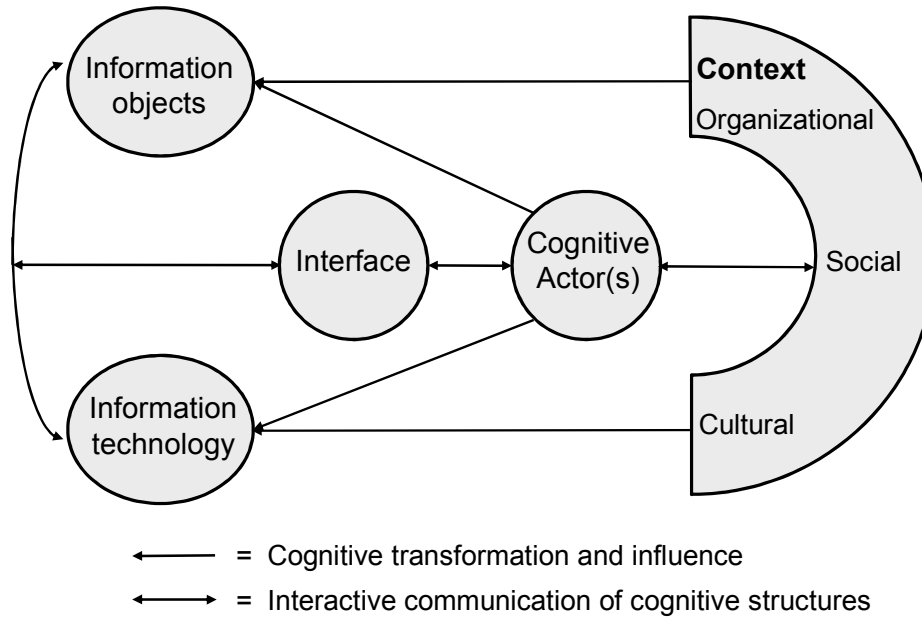= Interactive communication of cognitive structures

Figure 4. Model of interactive information seeking, retrieval and behavioural processes
(Ingwersen and Järvelin, 2005, p. 261, Figure 6.1)
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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 systems
- 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

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). It is based on the cognitive viewpoint, which the authors describe as the "epistemological holistic view" that processing of information is mediated through a system of categories or concepts that are a model of the individual's world (Ingwersen and Järvelin, 2005, 382). It is similar to what Hjørland (1995) describes as the "socio-cognitive" paradigm. Thus important factors affecting information behaviour are the perceptions of an individual or group and how these are affected by organizational, cultural and social contexts. A scholar seeking information is influenced not just by existing knowledge but also by the prevailing beliefs and traditions in the field and by colleagues.

Information objects such as books and articles represent an author's interpretation of the world, and that interpretation is shaped by organizational, cultural and social contexts. The author or information provider is also influenced by his/her perception of the reader or information user. Unlike Leckie *et al.* (1996), Ingwersen and Järvelin refer to the different contexts of the information seeker, the author, the selector etc. Authors are influenced by their context to communicate information and the recipients interpret the information according to their context. Thus the intended meaning and the received meaning may not be the same.

Wilson models

Wilson's models (Wilson, 1981, 1999; Wilson and Walsh, 1996) have been elaborated over many years. They take into account many of the elements identified in other models, including contextual, role-related and personal (psychological and demographic) factors.

According to Wilson's 1981 model of information behaviour (Figure 5), a particular need leads a user into information-seeking activities and these may take various forms. A person seeking information uses information systems or other information sources. Formal information systems and sources may be used, such as libraries and on-line systems. 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.
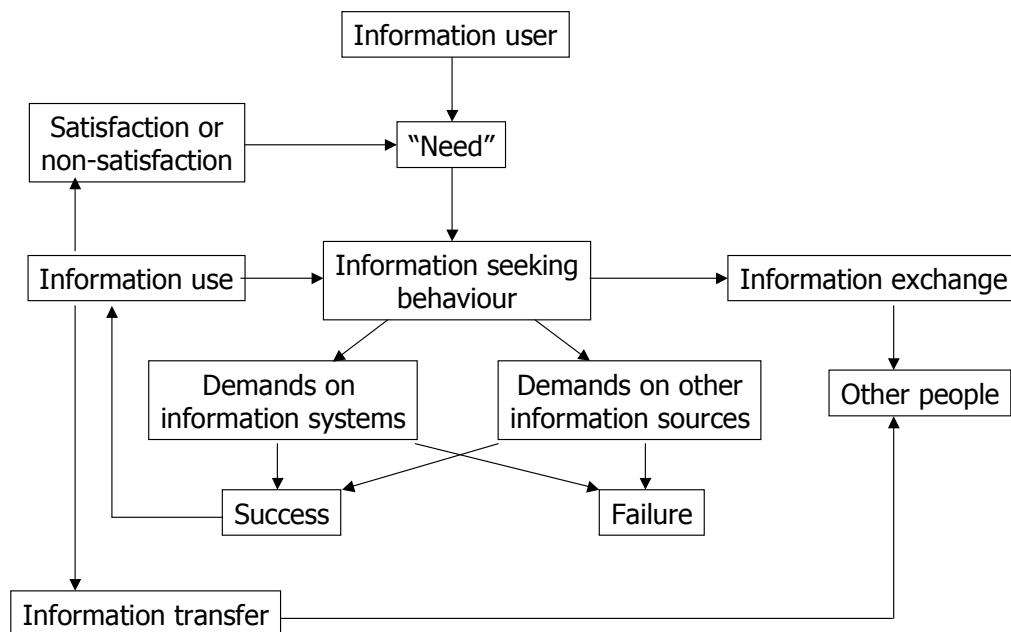

Figure 5. Wilson's 1981 model of information behaviour

Wilson considered needs and other factors affecting information-seeking behaviour in another model in his 1981 paper:
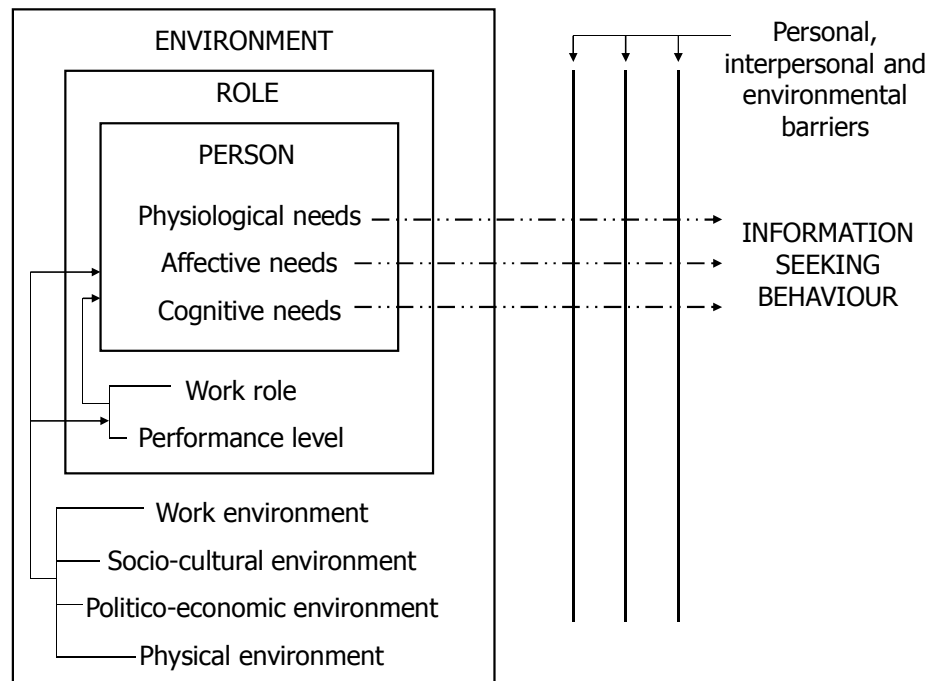

Figure 6. Wilson's 1981 model of information-seeking behaviour

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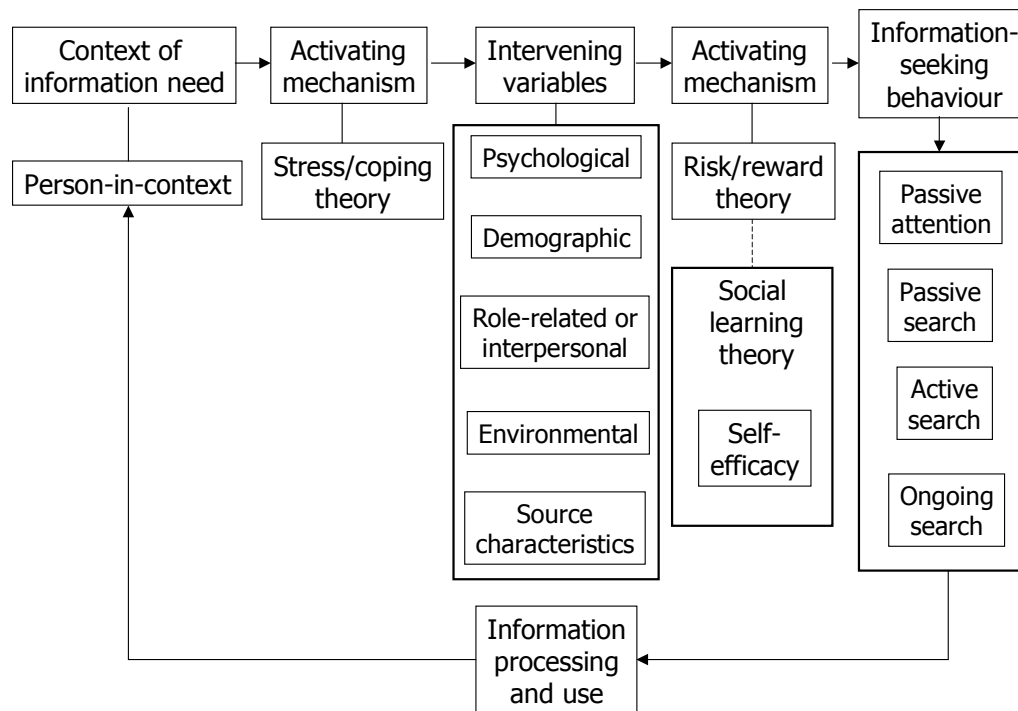

Figure 7. Wilson's 1996 model of information behaviour

The information user is shown as "person in context". As in the earlier information behaviour model (Figure 5), the revised model shows a 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.

Among the intervening variables in the model are personal and psychological factors. As an example Wilson describes cognitive dissonance as a motivation for behaviour: "... conflicting cognitions make people uncomfortable ..." and "One of the ways in which dissonance may be

reduced is by seeking information ..." (Wilson, 1997). 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. The role-related intervening variables echo the work roles and tasks in the model of Leckie *et al.* (1996). Source characteristics include accessibility and credibility, which are also important elements of the models of Leckie *et al.* (1996) and Johnson (1997).

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

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.

The focus of the Wilson models discussed so far is on the information user. The role of communication as an aspect of information behaviour is addressed in his 1999 model, which links information seeking to communication, and thus to the information provider:
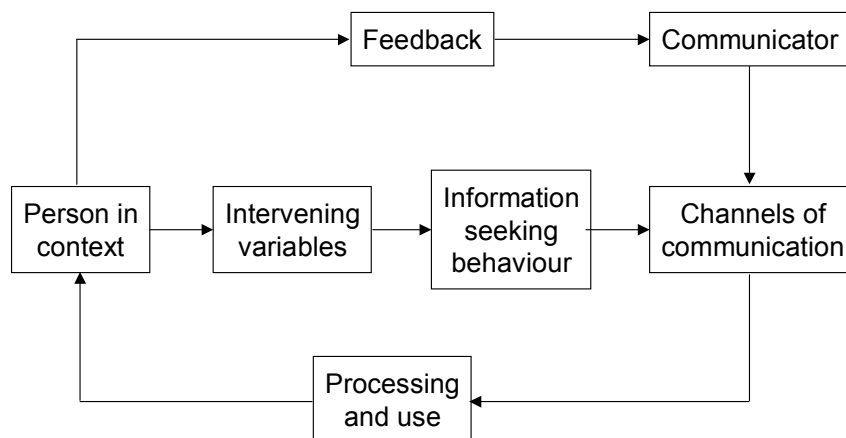

Figure 8. Linking information seeking and communication (Wilson, 1999)

Wilson uses the term "channels of communication" in this model to mean information sources. 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.

A great strength of the Wilson models is that they are linked and one can provide the detail that underlies the elements in another. Wilson points out, for example, that the 1981 model of information seeking (Figure 6) should be taken to elaborate the "person in context" box of the 1996 model (Figure 7). "Consequently, no one model stands alone and in using the model to guide the development of research ideas, it is necessary to examine and reflect upon all of the diagrams in the 1981 paper as well as the 1996 model" (Wilson, 2005).

Further insights into communication as part of information behaviour can be gained from communication theory, from which factors can be identified that are not included in the models covered thus far.

Communication models

Various communication theories and models have been developed relating to mass communications (McQuail and Windahl, 1993) and information diffusion (Rogers, 2003) but there have been few if any attempts to link them to LIS models.

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 usually describe one-way communication, directed by the sender, who thus influences the recipient. The focus is on whether the communication produces the effects intended by the sender, rather than on the recipient's situation and needs. An example is Lasswell's (1949) verbal formulation: "Who says what to whom through what medium with what effect?"

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 (Figure 9).
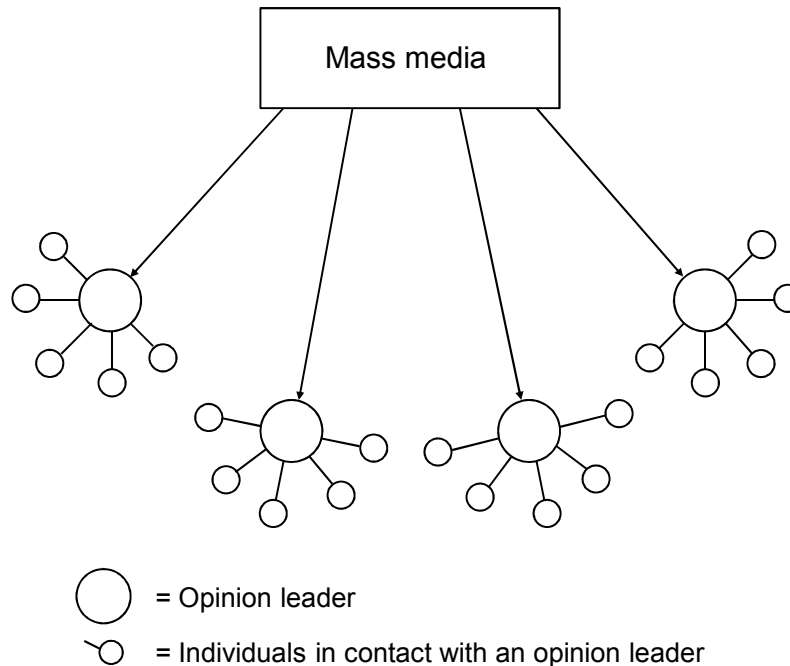
Figure 9. Two-step flow of information (Katz and Lazarsfeld, 1955) as represented by McQuail and Windahl, 1993. Reproduced with permission from Pearson Education Limited.

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. 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". 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, p. 19). Effective opinion leaders are likely to be homophilous with members of the target audience. "Homophily and effective communication breed each other" (Rogers, 2003, p. 306).

Taking a social-psychological perspective of mass communication, Maletzke (1963) developed a conceptual model that takes into account the perspective of the receiver as well as that of the communicator.
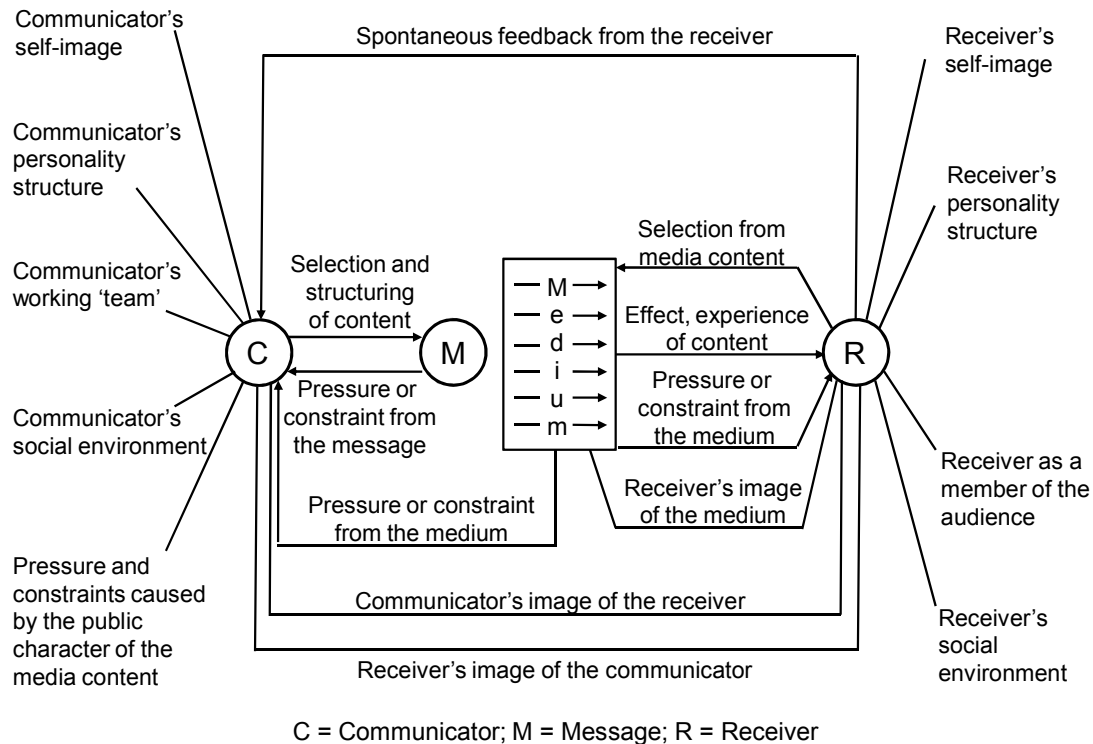
C = Communicator; M = Message; R = Receiver

Figure 10. Model of the process of mass communication (Maletzke 1963) as represented by Windahl *et al.* 2009

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. The communicator's self-image, personality, working and social environment and image of the receiver affect the communications produced, which may reflect the aims and views of the communicator and his/her organization rather than the needs of the receiver (Windahl *et al.*, 2009, pp. 162-6). The receiver, on the other hand, reacts to and interprets communications according to his or her own context, self-image, personality and environment.

Maletzke's model also shows that communications are affected by constraints inherent in the message and in the medium. For example, 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.

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.

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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).

The communication process, also referred to as the information communication chain (Robinson 2009), involves an author or information producer creating information products that are used by the information seeker. As described by Ingwersen and Järvelin (2005), the process may also involve intermediaries in the process, including indexers, designers of database structures and systems, and selectors who decide on the availability of information. Opinion leaders can play an important role in the communication and diffusion of information (Katz and Lazarsfeld, 1955; Rogers, 2003).

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 while searching for information (see also features of the information-seeking process below)

- 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.

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

- Motivating and inhibiting factors
  Factors that encourage or discourage information behaviour.

- Features of the information-seeking process
  Activities, feelings and thoughts experienced by an individual when looking for information

- Characteristics of information and sources, including:
  - Utility: factors such as the usefulness, relevance, timeliness, accessibility and ease of use of information or of a source
  - Credibility: trustworthiness, authority, reliability and lack of bias in an information source and the information provided

None of the existing models explicitly includes all of these factors and so far there has been little attempt to combine the insights from LIS models with those developed in communication theory. A new model is now presented that incorporates these factors and links information seeking and communication.

Information-seeking and communication model

Figure 11 shows a schematic representation of this novel information-seeking and communication model (ISCM).
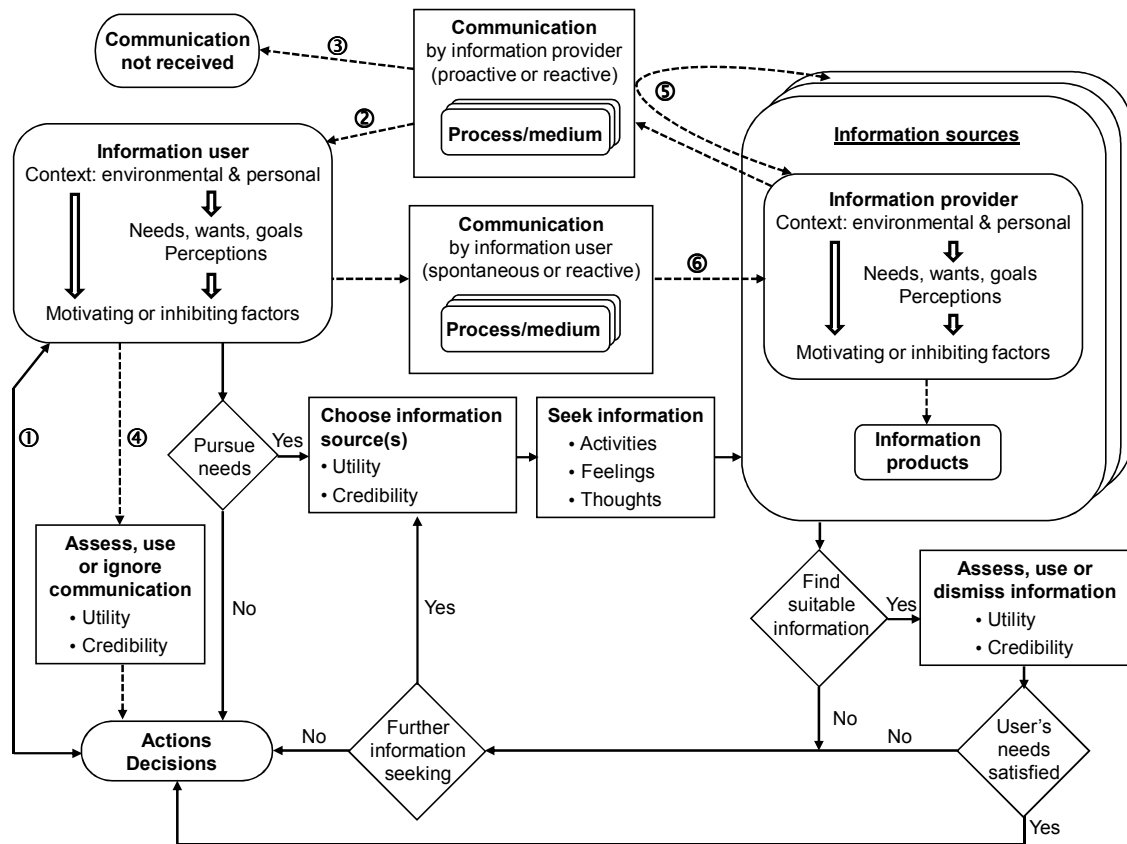

Figure 11. Information-seeking and communication model (ISCM)

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

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 information (as in Maletzke's model, Figure 10), whether or not they actively use it

Information sources may be information products or the providers of those products. Information providers are individuals, groups and organizations who produce, supply or communicate information, or who 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

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

Both information users and providers operate within their own contexts, which affect their needs, wants, goals and perceptions and thus their information behaviour. The model shows two main types of context: environmental and personal.

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

The personal context can include an information actor's demographics, expertise (including knowledge, education, training and experience) and psychological factors. As described above, 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 while searching for information

These personal and contextual factors and the needs, wants, goals and perceptions that result from them may motivate or inhibit information behaviour, including the user's decision on whether to seek information and which sources to use, and the provider's decisions on whether to communicate, what to communicate and how. Thus the ISCM captures factors identified in other models, including work role, tasks and resulting information needs (the model of Leckie *et al.*, Figure 1), demographics, experience and beliefs (Johnson's model, Figure 2), context (the model of Ingwersen and Järvelin, Figure 4), environment (Wilson's 1981 model, Figure 6) and many of the activating mechanisms and intervening variables in Wilson's 1996 model (Figure 7). It also encompasses Johnson's notion of salience: if an information user believes that a source will provide useful information, he or she is likely to be motivated to use it. Additionally, the model shows that contextual and other factors affect the information provider as well as the user, as in Maletzke's model (Figure 10).

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 11).

An information user who decides to seek information may have a number of information sources to choose from. They include information providers and the information products that they produce. Two important characteristics of information and sources are utility and credibility. Utility refers to the usefulness, relevance, timeliness, accessibility and ease of use of information or of a source. Credibility refers to the perceived trustworthiness, authority, reliability and lack of bias: "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).

Utility and credibility 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 organisation 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. Utility and credibility are key influencers affecting a user's choice of sources and judgment 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 them.

Information seeking includes 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

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and Kuhlthau models, and the thoughts and feelings associated with those activities may be described as in the Kuhlthau model.

If users find information from a source, they can assess it based on its characteristics such as utility and credibility and, if it meets their needs, use it to make decisions and take action. Alternatively they may dismiss the information – for example because it has low relevance (poor utility) or because it is not perceived as credible. If they 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. Again, the situation may subsequently be reviewed depending on changes in needs, perceptions, motivating or inhibiting factors (arrow ① in Figure 11).

The communication arrow ② in the model represents situations in which providers communicate directly with users. This may be done proactively, for example speakers making presentations at meetings, official bodies issuing regulations, guidelines and other information products, and companies advertising to potential customers. Communication may also be reactive, for example libraries and information centres responding to enquiries from users. The model shows that different communication processes and media can be used. For example, the provider may send information in the form of a printed document by post, or it may be sent by email or made available through a website, or the information may be presented orally in a telephone call or a presentation. Arrow ③ shows that not all such communications are received by the targeted information users.

A user who has received a communication (arrow ④) 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).

An information user may communicate with an information provider (arrow ⑥). Again, this may be done proactively, 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.

Conclusions and further research

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 ISCM, by including both the user and the provider, gives a more

comprehensive picture than other models. While drawing on previous research, it is hoped that it offers fresh insights into the seeking, use and communication of information, the factors affecting them, and the importance of the utility and credibility of information and sources.

Returning to the question raised at the beginning of this paper on the value of theories and models of information behaviour, the ISCM provides an opportunity to answer this. Since it captures key elements of existing models, and is thus built on the research supporting them, if its value can be demonstrated through empirical research this may provide further endorsement of the value of the other models. It will also be a step forward in answering the criticism of LIS research of failing to build on existing theory.

The model is now being used to investigate information behaviour associated with the provision of healthcare, as this is a fertile field for exploration (Coumou and Meijman, 2006; Davies, 2007; Dawes and Sampson, 2003; Gorman, 1999; Lacey Bryant, 2000). It is hoped that the findings will provide evidence of the practical relevance of the model and thus of the other models, and highlight any modifications that may need to be made.

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