

Evolving Perspectives of Human Information Behavior: Contexts, Situations, Social Networks and Information Horizons

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Abstract

This paper presents an evolving framework of human information behavior. The framework emerges from theories and empirical studies from a variety of research traditions, including information science, communication, sociology and psychology, that inform our understanding of human information behavior. First, fundamental concepts, such as context, situation, and social networks, are discussed. Using these concepts, a series of propositions that strive to elucidate, that is, provide a framework for exploring, human information behavior are proposed. Information human information behavior, including information exploration, seeking, filtering, use, and communication, are included (to varying degrees) in the framework. The framework also incorporates cognitive, social, and system perspectives. A key concept in the framework is the notion of an “information horizon.” Within any context and situation is an “information horizon” in which individuals can act. Information horizons, which may consist of a variety of information resources, are determined socially and individually, and may be conceptualized as densely populated solution spaces. In a densely populated solution space, many solutions are assumed, and the information retrieval problem expands from determining the most efficient path to the best solution, to determining how to make possible solutions visible -- to an individual(s) and to other information resources.

1. Introduction

This paper presents an evolving theoretical framework for human information behavior, including information exploration, seeking, filtering, use, and communication. It is based on empirical studies of human information behavior in a variety of settings (Iivonen & Sonnenwald, 1998; Sonnenwald, 1993, 1995, 1996) and theories from a variety of research traditions, including information science, communication, sociology and psychology that inform our understanding of human information behavior. I begin formulating the framework by discussing fundamental concepts, such as context, situation and social networks. Building on these concepts, I propose a series of propositions that strive to elucidate the framework. Key ideas in the framework include the introduction of the role of social networks in information behavior, and the concept of an “information horizon” in which we can act.

1.1 Related Research in Human Information Behavior

In her seminal work, Kuhlthau (1993) proposed a model of the information search process. In her model, the information search process is divided into seven stages: task initiation, topic selection, prefocus exploration, focus formulation, information collection, search closure and starting writing. Kuhlthau identified feelings, thoughts, actions, strategies and moods for each stage. She also proposed the “uncertainty principle” in information behavior, i.e., “uncertainty due to a lack of understanding, a gap in meaning, a limited construct initiates the process of information seeking.” (Kuhlthau, 1993, p. xxiii) The principle further asserts that uncertainty is a cognitive state which causes anxiety and stress and that can be expected in the early stages of

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the information search process. Thus, Kuhlthau's information search process model and uncertainty principle highlight the importance of viewing human information behavior as a process, and understanding that cognitive and affective components influence human information behavior.

Wilson (1996) proposed an inter-disciplinary, general model of human information behavior. In particular, Wilson draws on research in health information, advertising, economics, communication and organizational behavior. His model includes the following elements: character, or context, of an information need; activating mechanism, including stress/coping theory, that links needs and action; intervening variables (or barriers to seeking information), including psychological, demographic, role-related or interpersonal, environmental, and source characteristics; activating mechanism (or the decision to engage in information seeking behavior), including risk/reward theory and social learning theory. He proposes that these elements combine in a linear sequence to yield information seeking behavior, including passive attention, passive search, active search and ongoing search behavior. From his work, we see the importance of drawing on research outside our field; it adds richness and details to our models.

Belkin (1993) focuses on information seeking behavior in the context of information retrieval (IR) systems. While not proposing a general information seeking model per se, his work informs general models. In particular, he proposes a set of information seeking strategies that incorporate the goal of the interaction (learn/select), method of interaction (scan/search), mode of retrieval (recognize/specify), and type of resource (information/meta-information). He further suggests that users should share control and responsibilities with systems, and that during the IR process, users interact with texts (including humans who provide information.) Thus, Belkin contributes to information seeking behavior models by suggesting behaviors and aspects of processes that occur when individuals search for information in IR systems.

Ingwersen (1996) also focuses on information retrieval aspects of human information behavior. Stressing the cognitive perspective, Ingwersen proposes a polyrepresentation approach. That is, the individual user's cognitive space, including work task or interest, current cognitive state, problem or goal, uncertainty, information need and information behavior, and the social or organizational environment, including domains, strategies or goals, and tasks and preferences, should be represented in IR systems. This approach highlights the importance of cognitive and situational components in human information behavior.

These works combine to suggest the importance of investigating human information behavior as a process, taking into account cognitive, affective and contextual factors, and using research from multiple disciplines to increase our understanding of human information behavior. The framework presented in this paper builds on these ideas.

2. Fundamental Concepts

It is always difficult to conclusively define concepts; we use them throughout our work and yet often our definitions remain inadequate and ambiguous. For example, the concept "set" is a fundamental concept in the branch of mathematics referred to as "Set Theory." Yet, what is a 'set'? It has been defined as "any collection of definite, distinguishable objects of our intuition or of our intellect to be conceived as a whole" (Stoll, 1963, p.2). This definition begs the question: what is a collection? One could suggest a collection is a group; yet, what is a group? The circularity of this argument continues. However, it can be useful to discuss fundamental concepts so we may begin to develop a shared understanding and usage, and establish relationships with other concepts.

2.1 Context

One fundamental concept emerging in the field of information studies is “context” because context is seen as provided a source of meaning for human information behavior (Dervin, 1997). The dictionary defines “context” as “the circumstances in which a particular event or situation occurs” and “the essence of a group of events” (*American Heritage Dictionary*, 1985, pp. 316). Expanding on these definitions, the definition of “context” used in this paper is “the quintessence of a set (or group) of past, present and future situations.” There is usually some shared understanding of a context by its participants; this shared understanding need not be identical or complete (Schutz & Luckman, 1973).

Examples of contexts, then, include academia, family life, citizenship, clubs. Each of these contexts has boundaries, constraints and privileges as perceived by participants and outsiders. The perceived boundaries may not be identical across all participants and non-participants, yet many could agree on some of the boundaries. That is, there is some shared understanding about the context. For example, many researchers in academia would agree that writing journal and conference papers is more typically done within the context of academia than the context of family life. That is, writing papers is within the boundaries of the academic context and outside the boundaries of family life. We frequently speak of context in our everyday worlds; we speak of “the larger context,” “in the smaller context,” “in the broader context,” “in a narrower context,” “in a more well-defined context.” These phrases help illustrate that the boundaries of contexts are malleable, that is, flexible and subject to change. We can negotiate the boundaries.

Contexts are multi-dimensional in that they can be described by a variety of attributes (Dervin, 1997). The identification of attributes and their importance to information behavior is an active research issue. Examples of attributes that have been used to describe contexts include place, time, goals, tasks, systems, situations, processes, organizations and types of participants (e.g., see Taylor, 1991). Difficulties arise when attempting to exhaustively characterize a context. For example, as Simon (1981) points out, a bird’s eye view of an ant walking between two points along a sandy beach shows a seemingly erratic path. It is only when we view the ant’s path from a 3-dimensional perspective and notice the hills and valleys caused by the grains of sand that we begin to realize that the ant’s path is ingenious, not erratic. “Digger deeper” when conducting research on human information behavior, as suggested by Dervin (1997), helps researchers to understand the relationships among factors and human information behavior.

Characterizing contexts is further complicated because contexts are not discrete entities; two or more contexts may share common attributes. For example, a faculty member may be a teacher, researcher and administrator. From an outsider’s perspective, it may be difficult to determine when the faculty’s behavior is attributable to the context of teaching, research or administration. An individual may concurrently try to satisfy constraints of different contexts, e.g., as happens when a parent bringing children to the office when no other child-care options exist for them. We often learn more about contexts when conflicts among contexts emerge.

2.2 Situations

A second fundamental concept is *situations*. Within each context, a flow of situations arise. For example, within the context of academia, teaching a course and attending a committee meeting are two different types of situations. The phrase, “the context of a situation,” helps illustrate the relationship between contexts and situations. A context is somehow larger than a situation and may consist of a variety of situations; different contexts may have different possible types of situations. A situation may be characterized as a set of related activities, or a set of related stories, that occur over time. That is, we can characterize or describe situations by actions or behavior that occur over time, and which are perceived as being connected by participants and/or outsiders. For example, when explaining actions that occur among people working together on a project or in an organization, phrases such as “The situation is...”; “The situation in a nutshell is...”; “In this situation...”; and “That’s the situation” are commonly used in introducing and concluding the explanation.

Individuals might describe the same situation somewhat differently. That is, individuals might see different connections among actions based on their previous experiences and knowledge of similar situations or because they have privileged access to information about actions. For example, employees at higher levels in an organization often have information about upper management actions that other employees do not have access to. Thus, their description of a situation involving upper management might differ from another person's description. However, when descriptions of the same situation share nothing in common, we tend to think the person offering a unique description is insane, or if time proves the individual correct, a genius.

Situations within any given context are not necessarily linearly-ordered discrete events. For example, while creating a syllabus for a graduate course (a situation that occurs within the context of academia), a faculty member may receive a call from a spouse and discuss personal, family issues (a situation that occurs within the context of family life). In this sense, situations can be rapidly inter-leaved.

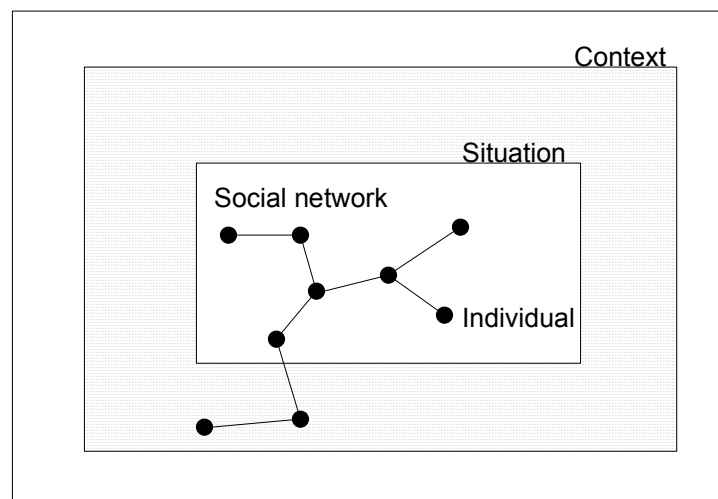


Figure 1. Simple case of a social network within a given situation and context

2.3 Social Networks

A third concept fundamental to this paper is “social networks.” This concept has been used in communication and social science, and it refers to communication among individuals, in particular, patterns of connection and resonance interaction (Wellman & Berkowitz, 1997). Different social network structures may exist, including a star configuration, chain or isolates (a social network of one.) These structures can be important (e.g., Sonnenwald, 1995) but they are not the focus of this paper. For a review of social network theory, see Chatman (1992.)

Social networks help construct situations and contexts, and are constructed by situations and contexts. For example, one explanation with respect to why some learners dislike one-way

broadcast distance learning courses is that the courses do not provide a social network for the learner; sustaining a learner's interest over time can be difficult without social interaction.

To explore the relationship among social networks, situations and contexts, consider the simplest case, illustrated in Figure 1. Within a particular context, a given situation occurs. In the context and situation, there is a social network. Individuals are members of the social network. Many members of the social network are participants in the situation but not all. An example of this case is an academic faculty meeting in which most, but not all, faculty members participate. Another example is a class session when not all members of the class attend, and a organizational meeting in which not all organization members attend.

We can build on the concepts of context, situations and social networks to explore human information behavior.

3. Propositions

Following are propositions that strive to describe human information behavior. The propositions aim to provide insights into human behavior. These insights suggest future research topics and information services and systems, including digital library services. The propositions build on previous research in the field of information studies, communication and psychology.

Proposition 1: Human information behavior is woven around, i.e., is shaped by and shapes, individuals, social networks, situations and contexts.

Human information behavior is shaped by individuals, social networks, situations and contexts. Researchers including Belkin (1980), Kuhlthau (1993), Dervin (1997), Ingwersen (1996) and others have proposed that context and situation play a role in information behavior. Other researchers, such as Berger and Luckman (1966), have proposed that individuals and social networks construct reality. Chatman (1993, 1996), Taylor (1991) and others point out that social networks play an important role in providing information as well as hindering information seeking behavior. Combining these ideas leads to this proposition. That is, an individual, within a particular situation and context, may encounter an information need; the situation and context help determine the information need.

This proposition suggests that social networks play a role in this process as well. Social networks provide a lens that facilitates the identification and exploration of information needs. Furthermore, the individual, social network, situation and context may help determine the information resources available to satisfy the need. For example, a major task for Ph.D. students is to identify a "good" research question and the resources required to explore, or address, the question. The individual student, their social network (e.g., their committee), the situation (doctoral dissertation task), and context (department, discipline, state of the art, etc.) help shape the question and available resources. In turn, the question and its answer may help shape the individual, social network, situation and context.

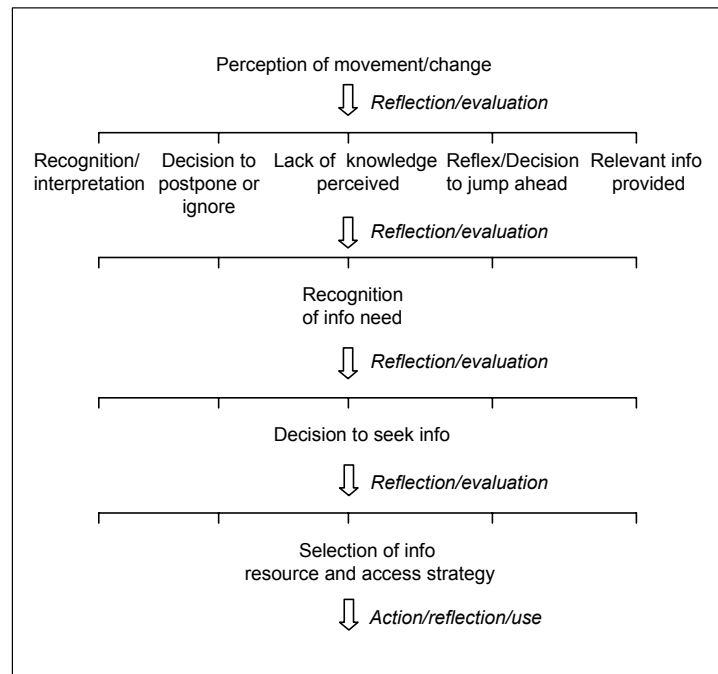


Figure 2. Possible reactions to change in a situation

Proposition 2: *Individuals or systems within a particular situation and context, may perceive, reflect and/or evaluate change in others, self, and/or their environment. Information behavior is constructed amidst a flow of such reflections and/or evaluations, in particular, amidst reflections and/or evaluations concerning a lack of knowledge*

In situations, there is always change, or movement. This perception of change is embedded within the ASK model (Belkin, 1980) and sense-making theory (Dervin, 1983). It is made explicit here to include the phenomena of information provisioning without an expressed information need or query. This may occur when members of a social network perceive a change and conclude that another member needs, or may need, information that they have and are willing to share. For example, at a project team meeting when someone new enters the room, a team member may immediately introduce the person when the team member knows that others do not know, or was not expecting, the person to join the meeting. This type of behavior has also been mimicked in systems that scan information resources for articles that may interest users based on previous knowledge of the user.

We perceive change, and may reflect and evaluate it (Gibson, 1979). Results of the reflection and evaluation may include: recognition (remembrance) or interpretation of the change; a decision to postpone further reflection on the change; a decision to ignore the change; recognition of a lack of knowledge about the change; a reflex response (such as blinking when an object comes near your eye or an automatic response of “what?” when interrupted or startled); a decision to jump ahead in the reflexive process, for example the implementation of a rule, script or action schema that provides prescription guidelines for human information behavior in stereotypical situations and contexts (such as asking “How are you?” after saying hello to a person); or relevant information about the change could be provided from other sources (see Figure 2).

As mentioned above, the reflection/evaluation of change may give rise to a lack of knowledge condition. That is, the individual may perceive they do not have the knowledge necessary to understand or interpret the change. At this point, the individual may reflect on and/or evaluate their lack of knowledge. Results of this reflection/evaluation may be similar to the reflection/evaluation when the individual perceived the change. For example, the individual may decide to postpone further reflection/evaluation or ignore their lack of knowledge (e.g., when a person assumes it is not worth their trouble), etc. However, the individual may also decide they have an information need that emerges from their lack of knowledge. As illustrated in Figure 2, a perceived lack of knowledge is explicitly differentiated from an information need. An individual may perceive they lack knowledge yet not believe they have an information need as a result. For example, a reader may not recognize the name of an actor in a newspaper article, and believe they do not need to know anything about the actor. Reflection and/or evaluation of an information need may yield a decision to seek information, and ultimately, selection of an information resource(s) and access strategy(ies) and use of information.¹

These reflections and evaluations appear to be motivated by accommodation with self, others and the environment, often with some form of dominance. For example, accommodation with self may include accommodating personal feelings such as uncertainty and confusion, as discovered by Kuhithau (1993). Accommodation with others may include considering how others could affect your career, and accommodation with the environment may include considering the impact your actions may have on the environment. Accommodation with self, others and the environment concurrently may not always be possible. In these instances, reflections and/or evaluations may be motivated by accommodation to the most dominant.

In Figure 2, this process is illustrated as a linear process. However, it need not be linear; it is simply easier to illustrate and discuss it as a linear process. In fact, the flow of these reflections and evaluations could be dynamic in the sense they could be interrupted at any time, or interwoven with other processes. The complexity of these reflections and evaluations and complexity of the process of these reflections and evaluations is, perhaps, unique to conscious human beings. Many animals exhibit a “stimulus-response” reaction to changes, and scientists are beginning to gain insights into how other animals, such as dolphins, may reflect before responding. However, human information behavior appears to be unique in its complexity and richness of reflection and evaluation, and subsequent behavior. The nature and process of these reflections and evaluations are complex research questions. Issues include: how individual preferences, social networks, situations and contexts combine to influence the process; what evaluation criteria are used; what intervention measures can be effective when the process fails to reach a satisfactory conclusion for the individual.

¹ Of course, the selection of information resources and access strategies, and use of information could be multiple steps, however, a detailed discussion of these steps is outside the scope of this paper.

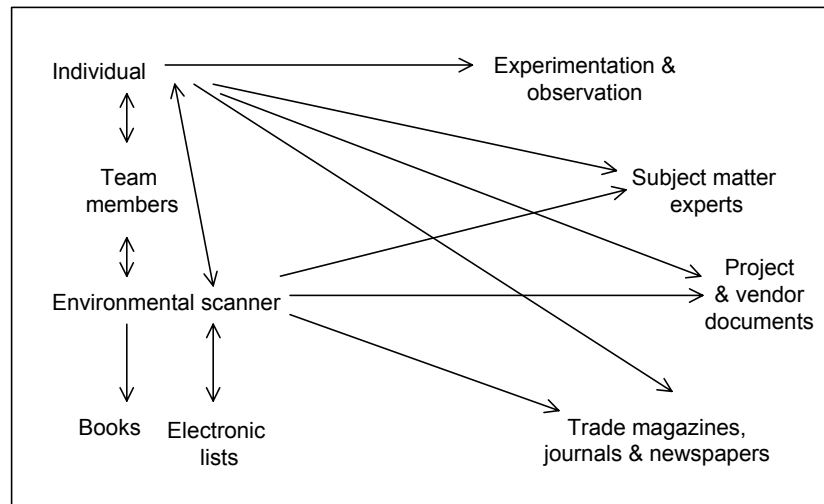


Figure 3. A graphical representation of a typical information horizon for an engineer

Proposition 3: Within a context and situation is an “information horizon” in which we can act.

When an individual has decided to seek information, there is an information horizon in which they can seek information. An information horizon may consist of a variety of information resources such as: social networks, including colleagues, subject matter experts, reference librarians, information brokers, etc.; documents, including broadcast media, web pages, books, etc.; information retrieval tools, including computer-based information retrieval systems, bibliographies, etc.; and experimentation and observation in the world. Figure 3 illustrates a typical information horizon for an engineering (based on Sonnenwald, 1993; 1996). The information horizon consists of the individual engineer, experimentation and observation in the world, subject matter experts (including clients and users), and team members. Typically resources that are in the information horizon but used less frequently include project and vendor documents, trade magazines, journals, and newspapers. Often an environmental scanner will scan books, electronic lists, subject matter experts, project and vendor documents, and trade magazines, etc. for information that the individual and team members may need based on the environmental scanner’s knowledge of their work or explicit requests

Information horizons, and subsequently information resources, are determined socially and individually for situations and contexts. For example, reviewers of academic papers help determine the references, i.e., information resources, that should be used in a paper. Reviewers may also discount an academic paper if “non-academic” resources, such as trade magazines, are cited as reliable, theoretical resources in a paper. In other situations and contexts, trade magazines are considered excellent sources of information. In some situations and contexts, an information horizon may be bounded by social economics and politics. For example, faculty and students at universities with limited resources do not have access to on-line bibliographic services or other information resources available in larger, research

universities. Of course, individuals also shape their information horizons. For example, individual knowledge of possible resources and preferences may help determine an individual's information horizon. Thus, information horizons are determined socially and individually.

Furthermore, information resources in an information horizon may have knowledge of each other and the individual, and may recommend resources to satisfy an information need or lack of knowledge. For example, a colleague may recommend a book or another colleague as a resource, and television news programs recommend web sites to their viewers as sources of information. In this way, an information resource may expand an individual's information horizon.

Information resources may also proactively provide information based on their understanding of an individual's lack of knowledge or information need. Examples of such services include listservs, newspapers, and colleagues who offer information.

This proposition suggests the importance and possibilities for digital library resources (as well as traditional library resources) to have knowledge of other resources to recommend those resources when appropriate to meet users' needs. It also suggests digital libraries (and traditional libraries) should include communication or collaboration tools to facilitate information seeking and dissemination among individuals, social networks, human intermediaries, and subject matter experts, etc.

Proposition 4: Human information behavior may, ideally, be viewed as collaboration among an individual and information resources.

The goals of collaboration, in this sense, are the sharing of meaning and resolution of a lack of knowledge condition. Collaboration with (and among) information resources ideally includes reflexive interaction, and/or reflexive provisioning of information. For example, many authors, artists and publishers reflect on their potential readers and write, illustrate and design books with the intention of provisioning information and sharing meaning with their future readers. This suggests a reflexive provisioning of information. A reference interview in which an intermediary asks a patron about the intended use of the search results, details about the search request topic(s), their evaluation of preliminary search results, etc. is an example of reflexive interaction, and thus collaboration during the search process.

Furthermore, collaboration often presupposes continuing relations. For example, many individuals will only invest time learning a computer-based system, such as an Internet search engine, when they believe they will use the search engine again in the future. Information filter programs presuppose that users will continue to need information from their associated resources.

Collaboration among the individual and information resources will, of course, be bounded by the individual's information horizon for the given situation and context. A challenge is to understand how an individual's information horizon can be expanded to include appropriate information resources, especially in digital libraries. An additional challenge is to understand how information retrieval systems and services, e.g., in digital libraries, can collaborate with individuals to facilitate an effective resolution of the individual's lack of knowledge condition. It suggests that collaboration technology, such as synchronous audio and video and shared applications, may have a role in information retrieval systems and digital libraries, e.g., to provide shared interactive access to information retrieval tools among users and professional intermediaries, etc.

Proposition 5: Information horizons may be conceptualized as densely-populated solution spaces.

Because information horizons consist of a variety of information resources, including social networks, documents, information retrieval tools and experimentation and observation in the world, many of which have some knowledge of each other, perhaps, information horizons may be conceptualized as densely populated space. In a densely-populated solution space, many solutions are assumed, and the information retrieval problem expands from determining the most efficient path to the best solution, to determining how to make possible solutions visible -- to an individual(s) and to other information resources.

The shift from a sparsely populated solution space to a densely populated solution space is a foundation of combinatorial chemistry. In combinatorial chemistry, many experiments are performed simultaneously. The earlier paradigm in chemistry allowed for one experiment to be conducted, results evaluated, and based on the results, a subsequent experiment was conducted. Thus the solution path was comprised of a linear sequence of steps, similar to many information retrieval systems today where queries are sequentially input until results are obtained. However, when I go to a colleague or an experienced reference librarian for assistance, they typically suggest multiple possible resources and/or ways to locate possible resources, and proactively seek feedback on my relevance assessment of these resources. Data fusion algorithms that send multiple queries simultaneously to databases and systems that incorporate user relevance feedback judgments are examples of this paradigm shift. However challenges remain. How can systems provide integrated access to the variety of information resources typically found in an information horizon? What do resources need to know about each other? What do resources need to know about the individual, social network, situation and context? How can solutions be made visible or accessible to individuals?

Individuals may not conceptualize their information horizon as densely populated (e.g., see Chatman, 1996), and, perhaps we can never develop algorithms and interfaces sufficient to support the information behavior of every individual, social network, situation and context due to the inherent complexity and variability in this challenge. However, perhaps a digital information horizon could take into account an individual's social network by also providing access to the social network and expanding it to include additional human experts who could either satisfy the need directly or provide pointers to appropriate resources. Thus the problem further shifts from the traditional focus of eliminating human intermediaries to providing access to many human intermediaries.

4. Conclusion

In summary, this evolving framework incorporates cognitive, social, and system perspectives and builds on theories in information and library science, communication, sociology, and psychology. Human information behavior, including information exploration, seeking, filtering, use, and communication, are included (to varying degrees) in the framework. It suggests social networks play an important role in human information behavior through helping to define an individual's information horizon and through actively participating in the human information process. Future work includes elucidating the framework and exploring how the framework may guide the design of systems to support human information behavior.

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