

Investigating patterns in information seeking: concepts in context

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INTRODUCTION

My remarks today concern the development of a theoretical framework for research into information seeking in various contexts. This ISIC research gathering is of singular importance because it is dedicated to the study of contexts in which people seek information in the conduct of their lives. For the most part, information science has tended to overlook context as a significant factor in the design of information systems and services. As a result much of the research in the field has been conducted in the "bees in a jar" mode of study as criticized by Cronin and Davenport at recent conference of the Association for Library and Information Science Education. While this laboratory approach has provided some important findings, it has offered only limited insight into information seeking behavior in the context of daily living. To neglect context is to ignore the basic motivation and impetus that drives the user in the information seeking process.

Research centering on information seeking in contexts offers opportunities for investigating differences that are unique to a situation while at the same time revealing patterns of information seeking across a variety of contexts. This contextual approach also provides opportunities for discovering fundamental, underlying concepts for understanding information seeking and use from the user's perspective. These underlying concepts studied in a variety of contexts offer opportunities for developing a foundational theoretical framework that is essential for designing information systems and services that respond to users' needs in the complex technological information environment.

SOME CONCEPTS FROM INFORMATION SCIENCE

At the first ISIC conference in Tampere, Finland in August 1996, Brenda Dervin and Tom Wilson gave thoughtful keynotes on the conceptual framework underlying the study of information seeking. Dervin (1997) expanded on her work in sensemaking to present a provocative essay on context itself as an essential foundational concept. She reviewed an extensive body of literature to support the concept of context as a necessary source of meaning. Wilson (1997) expanded on his general model of information behavior to incorporate consideration for a variety of interdisciplinary perspectives raising important issues related to the context of information need and the person-in-context.

In addition, we can draw upon a number of basic concepts from information science to inform our thinking about information seeking in contexts. Following are some examples of information science concepts that contribute to the theoretical framework of information seeking in context.

One example is the concept of a problematic situation that Belkin and his colleagues have developed over the years based on the notion of an Anomalous State of Knowledge and emphasizing that people experience different knowledge states promulgated by a problematic situation. The closely related work of Ingwersen, on a cognitive approach to information seeking as opposed to a technical orientation, offers an important concept for the consideration of context. Along these same lines is Taylor's early work describing four levels of information need and his later writing developing a framework for considering different information use contexts.

Another example is relevance, a fundamental concept in information science described in Saracevic's 1975 paper. Relevance is being redefined by a number of researchers including Saracevic with Mokros and Mullins, as well as Schamber, Barry, Harter and many others. This recent work strives to incorporate the idea that the user's judgment of relevance may not match the system's determination of relevance, raising questions about the traditional view of such concepts as: recall and precision; exhaustivity and accuracy; relevance and pertinence.

A third example that may be considered as an essential conceptualization for studying context is the user-centered movement described in the 1986 paper by Dervin and Nilan. Allen's work on defining a user-centered approach is a good example of the development of this concept, with related work from Bates, Bruce, Morris, Solomon and many others.

These concepts may be substantially expanded and elaborated by studying each in a variety of contexts. In this way, research in information seeking in context has the potential for making important contributions to the development of fundamental concepts in information science. On the one hand, study of concepts within context reveals the impact of situation on general

conceptualizations and exposes that which is situation specific. On the other hand, study within context reveals substantial patterns that hold across different situations and builds an understanding of the general characteristics of information seeking behavior.

BUILDING A THEORETICAL FRAMEWORK

A productive model for contributing to the theoretical framework of library and information science is one that: 1) begins by addressing the situation at hand, a problem within a specific context, but does not stop there; 2) goes on to elicit patterns in that context that may be studied in other contexts, often articulated in a model; 3) and then moves beyond patterns to discover and develop underlying concepts that contribute to the theoretical foundation of the field. The concepts studied and developed in context may be applied to designing effective information systems and services that respond to user's information needs. Such concepts also provide a sound basis for productive further research.

However, for those of us studying people in the context of real life situations, there are two important warnings that we need to heed. While information science research has tended to overlook context, we should avoid considering a context as an isolated situation that does not have any bearing on other situations of information seeking. This situation specific approach, although in the context of real life information seeking, fails to elicit patterns and concepts that lead to deeper understanding of information seeking behavior in general. This keynote raises the issue of developing continuity in the conceptual framework for information seeking in context that not only addresses the situation at hand but the larger conceptual questions of information seeking. In each study we need to ask the following questions. What is unique about the situation that does not translate to other contexts? What are the patterns that are apparent that may shed light on other contexts of information seeking? And most critically, what important concepts emerge that contribute to the underlying theoretical framework for developing systems and services that respond to the information needs of people in the course of their lives.

Another important caution for those of us studying users in context is to avoid shifting from problem to problem and to be willing to stay with one problem to develop a stream of research that reveals patterns and concepts. A conceptual framework is built by studying a problem over time. Too often isolated studies in specific contexts have been conducted without any thought of follow-up or extensions that offer opportunities to go beyond the initial data to verification, refinement, and conceptualization. Only through sustained research do patterns and concepts emerge that allow the researcher to move beyond a particular situation to develop theory for research and practice. By studying a problem

over an extended period of time we begin to frame our research for articulation across contexts. Sustained investigation allows us to address all three levels of research: the situation at hand, the emerging patterns, and the underlying concepts of a theoretical framework for future research, design, and practice.

SOME CONCEPTS FOR CONSIDERATION

In my own research on the user's perspective of the process of information seeking, a number of general patterns have become clearer and some concepts have emerged over time and across different contexts. Today I will discuss some of the concepts that I have been working on within the developing theoretical framework of information seeking in context.

Process

The first and foremost concept emerging from this work has been the concept of process. In many cases, information seeking is more than source location and fact finding, or even question answering and problem solving. Ongoing studies have revealed a complex inquiry process that involves learning from a variety of inconsistent and incompatible sources. These studies of users' experience in the information search process reveal patterns in thoughts, actions, and feelings that has been described in the six stage model of initiation, selection, exploration, formulation, collection, and presentation. The concept of process has emerged from patterns revealed in sustained investigation in context.

This view of information seeking as a process, in which a person is actively constructing a new understanding from the information encountered, has some important implications for the way systems and services are designed. Context that requires exploration and formulation within the information search process is an essential consideration for developing intervention strategies that enable the user's constructive process. For example, browsing, traditionally considered a haphazard approach to information seeking, may become a strategy in the early stages of the information search process. Introduction of other strategies for constructing and creating are implicated when information seeking is viewed within the concept of process in context. Stopping at provision for locating and collecting and a best match approach to information retrieval becomes inadequate. A fresh view of intervention incorporating conceptual strategies is needed to address process in context. Some conceptual strategies that might be developed for application in the design of more responsive systems and services are: continuing, charting, composing, collaborating, and conversing. The conceptual strategy of continuing acknowledges that information seeking is an ongoing process rather than a single event and stresses the development of

support tailored for each stage of the information search process. Charting, the strategy of depicting an idea or set of ideas in a graphic or pictorial form, is helpful for organizing developing thoughts and for identifying that which needs further investigation. Composing, the strategy of applying all aspects of writing and notation, facilitates the formulation of thoughts during the information search process, as well as a means for the presentation of new understandings at the close of the process. Collaborating, the strategy of involving others as partners and advisors, is beneficial in working through the more difficult stages of exploring and formulating in the process of seeking information. Conversing goes hand-in-hand with collaborating by applying the simple strategy of talking that enables thinking in process of constructing from a variety of sources of information. These conceptual strategies may open opportunities for a fresh approach to the design of systems and services that accommodate the constructive process in information seeking in context.

Constructive Process of Information Seeking

There are a number of concepts related to the learning process that have some bearing on the process of information seeking. Learning begins with an area of uncertainty. Something is not known, understood, or able to be performed. The person is unable to do something, does not understand something, and needs to know more. This uncertainty initiates a process of construction that moves the person from uncertainty to understanding. The constructive process of learning involves the following concepts: Acting and reflecting; feeling and formulating; predicting and choosing; interpreting and creating. For these attributes of learning to be incorporated as underlying concepts in information science further research is required within the process of information seeking in a variety of contexts. Let us briefly consider the prospect of each set of concepts for adaptation into the theoretical framework of information seeking in contexts.

Acting and Reflecting - Dewey (1933) explained that action and reflection are necessary elements in order for learning to take place. Activity without reflection rarely leads to new learning. Action that is followed by reflection fosters construction of a new understanding from the activity situation. Acting and reflecting are important for learning in each stage of information seeking but particularly in the early stages when vague thoughts are becoming clearer. The information search process involves more than the activity of locating and collecting. The necessity of pausing for reflection, an important element in the process of information seeking that is frequently overlooked, is readily apparent when studied in context.

Feeling and Formulating - Kelly (1963) described the inherent relation between constructing and feeling. Feelings of uncertainty during information seeking are associated with one's lack of understanding of the problem at hand.

Feelings of confidence increase through formulation as one gains a clearer understanding. Formulation follows reflection, not in a strictly linear sense but in a reiterative way that moves the person toward construction. Feelings in the process of information seeking, traditionally ignored and even denied as unimportant, may be seen as a critical element in the experience of users when studied in context.

Predicting and Choosing - All throughout the process of information seeking the user is engaged in making choices. Kelly (1963) explained that choices in the process of construction are based on prediction of consequences. Although Kelly's explanation of prediction seems overly systematic and structured, when he described an individual's experience within the process of construction, a dynamic uncertain process is revealed. He depicted people working through the process by a series of choices from a range of alternatives and these choices are anything but obvious and straightforward. The ability to predict and to choose is important for selecting sources from an abundance of information and for determining strategies for progressing in the information search process. Context, as the information seeking environment, has important implications for predicting and choosing that warrants further study.

Interpreting and Creating - Interpreting information and creating a new understanding is the overarching goal of the process of information seeking. As Bruner (1986) explained, "If we are to understand it (new information), it will not be by means of a positivist archaeology in which every thing particular about it and everything leading up to it are finally dug up, labeled, and collated. However much we dig and delve, there is still an interpretive task." (p.53). Interpreting involves creating. The interpretive task of "going beyond the information given" is a central concept in Bruner's work. Information is interpreted to create what Bruner calls "products of mind." This mysterious capacity to interpret and create is at the core of what it means to be human. Interpreting is based on constructs built from past experience. In this highly individual process, people make connections between information in various sources, extend their own ideas, and create something new for themselves that is clearly influenced by context.

Process, as the central concept in my research, has been described in a sequence of stages that enable the person to construct a new understanding from the information encountered in information seeking. These related concepts serve to elaborate on this central concept of process when studied in context. Following are some additional concepts that have emerged from this work that are related to the concept of process in context.

Uncertainty

Uncertainty is another concept that emerges from this research. Uncertainty is not a new concept to information science. vanRijsbergen has studied the concept of uncertainty from the perspective of logic. Others have looked at uncertainty from a mathematical perspective of probability. Uncertainty is a concept that many scholars in other fields are considering as important in their theoretical foundation as well. The postmodernist Derrida recently described the central role of uncertainty in human endeavor in this way. "The process of making a good decision requires a period of uncertainty, in which it is unclear what is right." This simple statement emphasizes the importance of the concept of uncertainty for problem solving and inquiry.

In my research, I have noted the marked contrast between traditional library and information systems and services that are built on a principle of order and certainty, and the individual's profound experience of uncertainty, particularly in the early stages of the information search process. These findings indicate the need for considering uncertainty as a natural, essential characteristic of information seeking rather than regarding the reduction of uncertainty as the primary objective of information seeking. Uncertainty is a concept for information science that offers insight into the user's quest for a personal perspective within the process of information seeking, what I have called, formulating a focus. When uncertainty is accepted as an important concept many other related concepts become apparent. One is the notion of the relationship between uniqueness and redundancy of information. At the beginning of an information seeking process the likelihood of encountering uniqueness (new information) can be expected to be high and redundancy (familiar information) to be low. As the process progresses and the person learns more about the problem there is likely to be more of a balance between the two types of information; and at the close of the process the ratio may be expected to be reversed with uniqueness low and redundancy high. Therefore, uncertainty may be associated with high uniqueness and confidence with high redundancy. This concept is dependent on context and may be further researched and developed as an underlying principle for the design of systems and services that are more responsive to individual needs at different points in the information search process in various situations and settings.

Another concept related to uncertainty is the notion of the mood or stance of an individual in the process of seeking information. At the beginning of an information seeking process an invitational mood might be most appropriate for opening the individual to new ideas. At the close of the process, an indicative mood might be more productive for leading the individual to summarize, organize and present existing ideas. However, this may be counterintuitive for the more uncertain one feels the more likely he or she is to take on an indicative

approach with prescriptive steps for guidance. More research is needed to develop the concept of stance and its relation to uncertainty across a variety of contexts.

Interest is another concept revealed in this research to be associated with uncertainty. At the beginning of the process, when uncertainty was high, interest tended to be fairly low. At the close of the process, when uncertainty had decreased, interest frequently increased along with personal knowledge. Further research is needed of these critical shifts in interest and the relation to motivation and incentive as important concepts for information seeking in context.

The concept of uncertainty incorporates the user's perspective of information seeking and can only be considered within context. It is context that reveals the relationship of uncertainty, confidence, uniqueness, redundancy, stance, and interest and their implications for the theoretical framework of information science.

Complexity

A number of researchers working on the concept of complexity, including Bystrom and Jarvelin; and Pinelli and his colleagues, have implied a relationship between complexity and uncertainty. In my research, I have found the concept of complexity to be important for understanding the experience of uncertainty in the information seeking process. My findings, although too tentative for generalization, suggest that it is a person's perception of the complexity of a task that determines his or her experience of process and degree of uncertainty. Since it is the perception of complexity and not the complexity inherent in the task, tasks can not be labeled in advance as complex or simple. Of course, a novice is likely to perceive more tasks as complex than the more experienced. However, it is context that determines degree of experience. A task in which considerable construction is required is likely to be considered to have a higher degree of complexity, than a task that is considered routine. This more subjective method for determining complexity may prove productive for developing the concept within research in information seeking in context.

Task complexity is emerging as an important concept for understanding why and when the stages of the information search process are experienced by users in contrast to information seeking that is a more straightforward source-location and question-answering endeavor. Complexity and its relation to uncertainty and process deserve further investigation and conceptualization within context.

The Concept of Enough

The concept of enough involves the deceptively simple question of, "What is enough?" What is enough may have been a fairly straightforward notion when a

person could gather all there was to know on a problem or topic in a contained collection. The concept of enough is quite a different matter in the present information environment. Understanding "what is enough" is essential for making sense of the information available to us. Enough relates to seeking meaning in a quantity of information by determining what one needs to know and by formulating a perspective on which to build. The information search process treats the concept of enough as what is enough to make sense for oneself within a context. The concept of enough may be applied to each stage of the process incorporating the ability to recognize an information need, to explore information on a general topic, to formulate a specific focus, to gather information pertaining to a specific focus, to prepare to share what has been solved, learned, or created. The concept of enough can only be addressed within context for it is the context that determines "what is enough."

STUDYING CONCEPTS IN CONTEXT

All of these concepts have emerged from studies of information seeking in context and call for further research and development in contextual studies. The importance of context is central to our research. A few weeks ago while visiting the Whitney Museum in New York, I came across an exhibit entitled "Collection in Context." The paintings of the artist Richard Pousette-Dart were displayed within the context of his studio. The paintings took on new meaning when viewed from the context of where they were created. The subject of the painting somehow seemed less important when the creative context provided a new way of understanding the paintings. In a similar way information collections and the systems and services for accessing them need to be looked at within the creative context of the users "studio." Where, how, and for what purpose are the collections being used? Context takes the center as an essential component for understanding information seeking and use. The patterns and concepts emerging within these contexts are important for building a theoretical framework for information science.

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