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# **Information Needs: A Person-in-Situation Approach**

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## **ABSTRACT**

An understanding of information needs is an essential condition for developing effective information systems and services. Four approaches to information needs, identified as cognitive, social, social cognition, and organizational, are examined using a problem-solving model. Individual and situational variables that influence how individuals and groups experience information needs are identified, and a person-in-situation approach is suggested. Research into the information needs of users, and design of user-centered information systems and services, can be guided by an integrated understanding of how individual and situational variables affect information behavior.

## **INTRODUCTION**

Understanding the information needs of users is a first and indispensable step in designing and building effective information systems. Two research traditions have formed the basis of the investigation of information needs over the past several decades. The first investigated the information needs of groups of users. Social scientists, or social service workers, or engineers, were studied to discover how they experienced needs for information, resolved their information needs, and interacted with information devices and systems. As this research tradition progressed, it underwent considerable redefinition. In particular, Dervin (1980) drew attention to the situations in which people were found that gave rise to their information needs and information behavior. It became clear that research into the information needs of groups was using group membership as a surrogate for users' information situations. This reconceptualization made it possible to extend user studies beyond occupational categories, and to consider any groups of users who shared a situation that generated information needs. For example, one could investigate individuals who were unemployed, or who were experiencing a particular health problem, or who were encountering problems with family relationships. Research into social and situational influences on information needs has demonstrated that the situations in which people are found have a profound effect on their information-seeking behavior.

The second research tradition considered individual differences between users. Researchers considered how high-knowledge searchers differed from

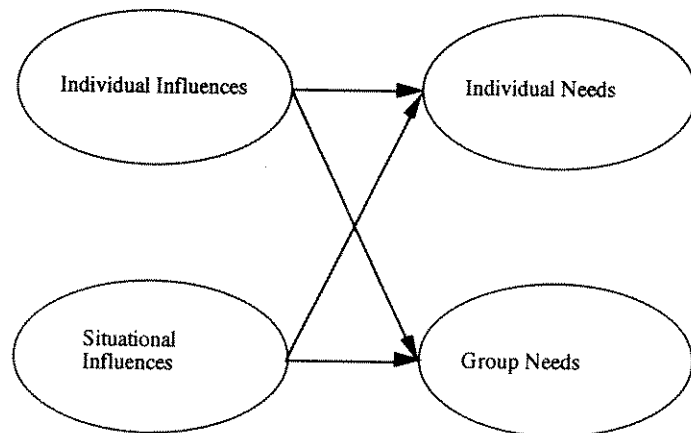
low-knowledge users, or how users with different cognitive styles experienced information needs or interacted with information systems. Here, the idea was clearly that, regardless of the situation in which an individual is found, there are individual variables that influence how that person acts. There has been a kind of "great divide" between these two kinds of research into user information needs. The perspective adopted in this paper is that personal and situational variables interact in generating information-related behavior, and that we cannot understand information needs completely without taking both of these approaches into account. This paper provides a "person-in-situation" model that reflects the need for more interactionist user studies and for a greater emphasis on user-centered information system design.

#### FACTORS THAT INFLUENCE INFORMATION NEEDS

Information needs occur in many different situations, and there are many different ways in which information needs are experienced by people. For example, people are simultaneously individuals and members of groups. Accordingly, we can distinguish two types of information needs: those that occur at the individual level, and those that occur within groups of various kinds. There are many influences upon people's behavior. Whether one is behaving individually, or as a member of a group, both individual and situational influences determine the behavior. This discussion presents us with an outline for beginning to understand information needs.

FIGURE 1

Model of information needs and influencing factors



The first arrow, linking individual influences to individual needs, is the cognitive approach. The second arrow, linking situational influences to individual needs, is the social approach. The third arrow, linking individual influences to group needs, is the social cognition approach. The fourth arrow, linking situational influences to group needs, is the organizational approach.

#### THE PROBLEM-SOLVING APPROACH TO INFORMATION NEEDS

The model presented above integrates four different approaches to information needs. Two of the approaches represent individual or personal influences, and that the other two represent situational variables. It is now necessary to build an understanding of how the four approaches to information needs can be integrated into a single "person-in-situation" model. A simple problem-solving model of information behavior provides the basis for this elaboration of each of the four approaches. This problem-solving model consists of three steps: perceiving a problem, examining alternative solutions, and evaluating and selecting a solution. Each of these steps engenders information needs.

#### INFORMATION NEEDS: A COGNITIVE MODEL

The cognitive model is concerned with individual influences on individual behavior, and in particular with how individuals' knowledge structures influence behavior. The basic idea in the cognitive perspective is that two people will experience different information needs in identical situations because they have different understandings of these situations. Their understandings will be different because their knowledge structures derive from different past experiences. The problem-solving model allows us to elaborate the cognitive approach by considering in turn how knowledge structures are employed in perception, how knowledge structures suggest alternative courses of action, and how knowledge structures are used to select a course of action. Information needs may occur whenever there is a failure of the individual knowledge needed for perception, alternative identification, or alternative selection.

#### Knowledge Structures, Perception, and Information Needs

People may lack the knowledge that is necessary for them to perceive their situation. If their experience has not given them appropriate knowledge structures, they will not see what is happening in the situation. The first time someone encounters a new technological development, such as an ATM, or an online library catalog, failures of perception may occur. More common than absolute failures of perception, in which no knowledge structure can be activated to make sense of a new situation, is the kind of failure of perception that occurs when people activate an inappropriate knowledge structure. For example, treating a sophisticated information retrieval tool as if it is a card catalog may result in ineffective or inappropriate searching.

Awareness of an anomaly in knowledge occurs as a result of a "reality check", when reality as perceived fails to correspond to reality as experienced. One specific example of a reality check is the experience of failed intersubjectivity. If someone perceives a situation in one way, that person may expect others to share the perception, and to act according to that shared perception. When others act in apparently inappropriate ways, a suspicion may be born that they do not share the perception, and accordingly that the perception is faulty.

When knowledge structures are incomplete, leading to failures of perception, resolving that anomaly or making one's knowledge structures more complete is necessary for continued functioning. Frequently, the process of resolving the anomaly may lead to information seeking, but obtaining information to resolve this sort of anomaly can be extremely difficult. The failure of perception may be so complete that it is difficult or impossible to articulate the information need. If a person has been unable to activate any knowledge structure, then questions such as "What was that?" or "What happened?" are likely to occur. If a person has activated an inappropriate knowledge structure, then the awareness of the information need may be a bit more coherent: "I thought it was x, but it's not".

#### **Identification of Alternative Actions**

If the failure is not one of perception, but of alternative identification, then resolving the anomalous state of knowledge may be easier. In such a situation, behavior is undetermined because there is no ready supply of alternative courses of action. We might think of someone approaching an ATM or an OPAC terminal. Someone might tell them what it is, and they would say, "So that's what that is. I've heard of them. Now, what do I do?". Another way of thinking about this situation is to ask how an individual would go about trying to discover alternative courses of behavior. One way would be the familiar problem-solving process of trial and error. Other kinds of knowledge-acquisition activities might involve information seeking. Finally, there is the process of finding out everything about the novel situation or entity. Such knowledge may suggest courses of action, primarily by association or analogy. Learning more about a novel entity or situation involves identifying similarities with known entities or situations. Following these associative links can suggest alternative courses of action.

#### **Selection of Alternative Courses of Action**

Once adequate knowledge has been obtained to ensure that a number of alternative courses of behavior are identified, people may need help in selecting an alternative. In this case, there can be no clear and authoritative course of action dictated by the knowledge structures. Behavior in such situations may be

selected on the basis of high level heuristics that take into account the consequences of actions. For example, behavior could be selected to maximize the probability of obtaining the best possible consequence, or to minimize the probability of obtaining the worst possible consequence. If one does not have information on the likely consequences of alternative courses of action, then selection of behavior would require some inquiry into the possible consequences of particular courses of action. The action-consequence link can be obtained directly, through accounts of individuals who have chosen a particular course of action in the past. In addition, similar behaviors can be investigated to determine their consequences, so that the action-consequence link can be determined via analogy or association.

#### **INFORMATION NEEDS: A SOCIAL MODEL**

This section discusses information needs from the social perspective, emphasizing the social embeddedness of the process of defining and meeting needs and the situational factors that influence how people approach information needs. Since people are always embedded in social situations, it is sometimes difficult to distinguish clearly between the influences on information-seeking behavior that are individual and those that are situational. The basic idea in the social perspective is that two people with different backgrounds will behave similarly in the same situation.

#### **Perception and Social Influence**

Failures of perception are particularly noticeable when individuals are uprooted from their social context and placed in a situation in which they do not belong, and in which they cannot understand their surroundings. The inappropriate behaviors sometimes associated with tourists serve as an example of the importance of social context in perceiving problems. The situation provides a context that constrains the use of knowledge structures in perception, and that contains sources of information that can overcome failures of perception.

#### **Identification of Alternative Actions**

If the problem is clearly perceived, identification of alternatives to resolve the problem is necessary. Again, this task of identifying alternatives is constrained by social factors. The question "Now, what do I do?" can only be asked in a constrained way, as "What do I do in this situation?". Techniques and strategies for finding out what to do in any particular situation are largely interactional. Trial and error strategies are frequently attempted, but the success or failure of any particular trial can only be judged by the reaction provided by the social context. Similarly, it is possible to observe others in similar situations and to try to induce possible courses of action.

### Selection of Alternative Courses of Action

Individual values that lead to decisions regarding alternative courses of action derive from the social context in which the individual is embedded. It follows that the process of selecting a single course of action from a range of possibilities is influenced by social factors. At the same time, action-consequence links are not absolute, but relative to the specific social situation in which the individual is embedded. Accordingly, information seeking concerning consequences must be constrained to the social context of the information seeker.

The interactions between individual and situational factors that influence problem solving can be summarized. People can only perceive the problem, and identify and select solutions, from their knowledge structures. But the problem-solving situation constrains the knowledge structures that can be applied to the problem. At the same time, the situational context may provide opportunities to learn about the problem, leading to a transformation of individual knowledge structures.

#### THE COLLECTIVE NATURE OF INFORMATION NEEDS: A SOCIAL COGNITION MODEL

To consider the idea of collective behavior in information needs, we need to reformulate the discussion presented above. It is possible for a group to have information needs that go beyond the individual information needs of its members. The group needs do not replace the individual needs: rather, group and individual information needs occur concurrently. In group learning, or group problem solving, group information needs may occur that are quite different from individual information needs.

### Group Perceptions

Collective perception of any situation occurs when the members of the collective not only perceive the situation individually but also perceive that other members of the group perceive the situation in the same way. In other words, members of the group must:

- a) know that the situation is X;
- b) know that they know that the situation is X; and
- c) know that other members of the collective know that the situation is X.

The group perception of a situation, or of a problem, is thus more than the sum of its parts. Group perception begins when one member of the group perceives the situation in a certain way. That member then has the responsibility not only to communicate his or her perception of the situation, but to persuade the other members of the group that the perception is a good one (i.e., truthful, veridical, explanatory, workable). Some members of the group may not be easily persuaded to that particular perception, having viewed the situation somewhat differently. In a political process, groups of adherents holding different indi-

vidual perceptions will come together. It is in this process that the group perception emerges. The information needs associated with failures of collective perception are more than failures of perception of an external reality. They may stem from a failure of internal group processes of consensus building and persuasion. Group perception of problems may be influenced by other group processes. For example, groups tend to develop in-group biases that may prevent them from perceiving the value of external sources of information. Group knowledge structures can be as limiting and inappropriate as the individual knowledge structures discussed above.

### Identification of Alternative Actions

If the collective failure is not one of perception, but of alternative identification, behavior is undetermined because there is no ready supply of alternative courses of action. When a group seeks to identify alternatives, it frequently has no "procedures manual" to which it can turn, and it is thrown back on collective memory for ways of dealing with problem situations. In other situations, the group may delegate one of its members to collect information about alternative courses of action. There is a great deal of power in this role of information agent or "gatekeeper", and much responsibility. The information-seeking process must create an understanding of the possible alternatives that will fit in with the existing collective perception of the problem situation. If the alternatives identified through information seeking fail to respond to the existing perception of the problem, the alternatives will not be accepted by the group. This places the individual information seeker in a highly constrained situation. Alternatives that would be germane to some unacceptable interpretation of the situation will be ignored, unless the individual concerned is willing to begin the involved political process of renegotiating the collective perception of reality. This may give the individual the perception of being highly inflexible in his or her information search, but in fact the inflexibility comes from the collective nature of the information search.

### Selection of Alternative Courses of Action

Once adequate knowledge has been achieved to ensure that a number of alternative courses of behavior are identified, groups must select one course of action. We presume that the various courses of action suggested by collective memory, or by current information seeking, are equal competitors. The identification of action-consequence links requires information about similar groups who have made similar selections. It seems at least possible that this task will be easier for groups than for individuals. There is a high level of similarity between groups that may enhance the predictive power of an example from history. Because groups tend to submerge individual differences between their members, it is possible to typify groups rather simply. Religious groups, for

example, are categorized by ideology, nation-states by economic systems, organizations by governance structures. Given relatively simplistic classification schemes like these, it should be possible to identify a similar organization with a similar alternative, and to suggest, from the consequences in that case, what would be the consequences in this new case.

#### INFORMATION NEEDS: THE ORGANIZATIONAL PERSPECTIVE

Just as individual influences, in terms of knowledge structures developed and maintained by a group, can influence how that group perceives problems and deals with them in a variety of ways including information seeking, so also groups can be influenced by their larger social context. There can be many examples of groups whose collective activities are embedded in social contexts that constrain their behaviors. However, the best example may be the complex business organization. Here there exists a network of work groups that may find their understanding constrained by the context provided by the organization as a whole.

The organizational perspective seeks to explain group information needs by reference to the organizational context in which the groups are found. The basis for emphasizing the similarity of group behaviors within an organization is that, for the most part, the groups exist within the social structures and value structures of the organization. How groups work depends on how they achieve political consensus among their members, but that consensus is necessarily achieved within the framework of the organization. Groups who share the corporate framework and values will, therefore, necessarily share collective knowledge structures, and will experience information needs in similar ways.

#### Collective Perception and Social Influence

The evolution of a single, highly authorized interpretation of the problem situation in which a group is found depends on the organizational situation in which the group is embedded. It is quite possible for organizational values and culture to constrain the perception of situations that groups can develop. Awareness of an anomaly in organizational influences occurs as a result of a "reality check". It is in these anomalous situations that information seeking can be an important part of the resolution of the problem. Here, groups must obtain information from their organizational surroundings that will allow them to perceive the problem situation they are facing in a useful and canonical manner.

#### Identification of Alternative Actions

If the problem is clearly perceived, because the organizational signals are unambiguous, identification of alternatives to resolve the problem remains necessary. In an organization, the question "Now, what do we do?" can only be asked in a constrained way, as "What do we do in this situation in this

organization?". The techniques and strategies for finding out what to do in any particular organization are largely interactional. It is possible to observe other work groups in similar situations and try to induce the possible courses of action. Analogy or association with other related situations might be another strategy for suggesting actions. But the organizational embeddedness of each situation may make information seeking somewhat easier. There may be instruction manuals or authority figures that can give direction towards alternative acceptable courses of group action in organizational situations. And where these are absent or ambiguous, there may still be an organizational ethos or culture that may suggest alternative courses of action.

#### Selection of Alternative Courses of Action

A work group trying to select an alternative course of action may need information about action-consequence links. However these links are not absolute, but are relative to the specific organization in which the group is embedded. So it is not enough to be able to know that a particular action has been associated with a particular consequence in the past. Rather, one must know that the action-consequence association has been observed in a roughly analogous organizational setting. The constraints of the organization may provide for a narrowing of the search for action-consequence associations.

#### THE PERSON-IN-SITUATION MODEL

We can now assemble the elements of a person-in-situation model of information needs. Personal and social factors constrain individual or group behavior. It is clear from the above discussion that how people behave at any point in their lives is constrained by their individual knowledge levels, abilities, and personal styles. At the same time, behavior is constrained by situational influences. An individual might be able to behave in a certain manner, but will be constrained by the realities of the situation to avoid such behavior. Similarly, a situation might permit several courses of action, but a specific individual might lack the knowledge or abilities necessary to complete one more of those possible courses of action. A group may have the internal dynamics and collective capabilities to select a variety of courses of action, yet find those courses of action constrained by organizational or social values. At the same time, we can see situations in which organizational and social influences would allow courses of action that are beyond the capabilities of a group limited by group dynamics and collective knowledge and abilities. Accordingly, we see individual differences and situational factors as acting concurrently to constrain individuals and groups in their behaviors or their choices of courses of action.

Information needs can be understood in the light of these constraints placed on individual and collective behavior. If an individual or group is constrained in such a way that only one course of action exists that will obtain a desired

outcome, behavior will be largely automatic. As a consequence, information needs are minimized. If, however, the situation changes, information needs may materialize. There are two possible ways that the situation might change. In the first scenario, the number of courses of action that will obtain a desired outcome increases. Problem solving in this context involves perceiving the options, exploring them, and selecting a single option so the individual or group is again constrained to a single course of action that will obtain a desired outcome. Information seeking may occur during this problem solving, and the information-seeking activities will be constrained themselves by individual and situational influences.

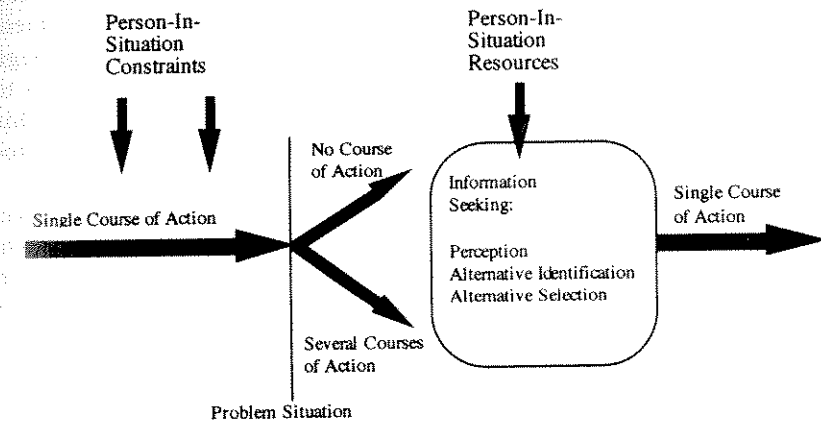
The other scenario is that the number of courses of action that will allow an individual or group to reach a desired outcome is reduced from one to zero. In such a situation, the problem-solving process involves a search for additional alternatives, an exploration of each alternative, and the selection of a course of action. Once this is accomplished, the individual or group returns to the desired state of having one course of action that will produce the desired outcome. Again, information seeking will occur during this problem solving, and the entire process will be constrained by individual and situational influences.

In this person-in-situation model, we see both personal and situational variables as posing constraints on behavior or on courses of action. This occurs at two levels. The first is the level of the situation that gives rise to the problem. Here the nature of the problem is determined by individual and social influences as they permit the possible courses of action to rise above one, or to drop to zero. The second level is the information-seeking process. Here, perceiving the problem, identifying alternatives, and selecting an alternative use resources that are determined by individual and social variables. For example, the knowledge resources necessary to perceive a problem are part of an individual's cognitive structures, but at the same time are derived from a socially-constructed understanding of the situation in which the individual is found. Similarly, the resources that a group applies to selecting a single desirable course of action may be found within the group's consensus-building process, but may simultaneously be constrained and influenced by the organization within which the group is functioning. This pairing of person-in-situation constraints with person-in-situation resources produces the following model (figure 2).

One additional complication must be added to the model. There is a highly complex interaction between personal and group information needs. In this discussion, we have tended to treat individual and group information needs separately. But in reality there are always links between the behaviors of individuals and of groups that are impossible to dissolve. This means that there must be a constant interaction between individual and group behavior, as each acts to cause and define the other. As we consider information needs, this complication means that no information need can be treated discretely or

FIGURE 2

A person-in-situation model of information needs



separately. Each need must be considered as part of a network of related needs, arising both in individuals and in groups.

### CONCLUSIONS

This discussion has proposed a way of understanding information needs that combines individual and social variables into a person-in-situation model. This approach can be seen as a guide for research in information science, and as a basis for developing principles that will guide the development and design of information systems.

Concerns about the quality of traditional user studies research have frequently been expressed. Dervin and Nilan (1986) and Wilson (1981) identified problems with much existing research, and the paradigm shift proposed by Dervin and Nilan (1986) and confirmed by Hewins (1990) suggests the need for continued evolution in approaches to user studies research. It seems clear that a unified and coherent understanding of information needs can only be obtained as researchers consider the problem situations that give rise to needs, and the information-seeking behaviors that resolve those needs, in terms of interactions between personal and situational variables. This will require more complex research designs, and more sophisticated data analyses, than those studies that simply focus on situational or on individual variables.

The second implication of the person-in-situation model developed here is that it carries with it the seeds of a principled approach to user-centered

information system design. How information behaviors are perceived and performed by users can be explained by how they perceive their information needs. A research path beginning with information needs leads to information tasks and how they are accomplished. As the resources required to complete information tasks are understood, it becomes possible to establish design principles that will permit information systems and services to enable users to complete their information tasks, and thus meet their information needs. This research path closes the loop that connects user studies with designing for usability.

In psychology it has been suggested that the person-situation debate has ended with a "tie": neither side has prevailed, and the interactionist paradigm has emerged. Such an outcome seems desirable in library and information science as well, although it poses major challenges for research design and for the conceptualization of information needs.

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