

# The Role of Experience in the Information Search Process of an Early Career Information Worker: Perceptions of Uncertainty, Complexity, Construction, and Sources

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**Information workers center on seeking, gathering, and interpreting information in order to provide value-added information as a basis for making decisions and judgments critical to the function of an enterprise. This longitudinal case study investigates changes in perceptions of the information search process of an early career information worker as he becomes more experienced and proficient at his work. Building on Kuhlthau's earlier research, comparisons of the user's perceptions of uncertainty, complexity, construction, and sources in information tasks were made over a 5-year period. This is a case study, but it provides insight into issues raised in prior quantitative studies of securities analysts.**

## Introduction

Information workers center on seeking, gathering, and interpreting information in order to provide value-added information as the basis for making decisions and judgments critical to the function of an organization or individual, frequently within the context of market profitability. In this situation, information seeking is a process of constructing new knowledge and understandings to add value to an enterprise. Information workers who are proficient at this process are extremely beneficial to the success of an organization. However, some workers are more successful than others at providing valuable information partly due to experience. While other factors also play a role, this study addresses questions related to the role that experience plays in information seeking and use. How do early career information workers approach information-seeking tasks? How do these approaches differ as they gain more experience? How can early career employees become proficient at adding valuable information as they develop expertise? This

article explores these questions in a longitudinal case study of an early career securities analyst.

## Review of Related Research

### *The Process of Information Seeking for Making Decisions*

Research on the decision-making process of managers is particularly relevant to this study as it reveals a relationship to the process of information seeking. In business environments, the overriding goal is the economic progress of the company. The primary task of executives is making judgments and decisions to meet this goal. Decision making involves a process of information seeking and use that takes place over time, commonly in rapidly changing, complex situations. A constructive process underlies both decision making and information seeking. The relationship between the decision-making process and the information-seeking process is relevant to this study as the primary work of securities analysts encompasses both processes.

The decision-making process has been described as occurring in three phases (Mintzberg, 1973): An Identification Phase, in which the need for a decision is recognized and a diagnosis is made, to understand the underlying problem; a Development Phase, which involves a search for, and development of, possible solutions; and a Selection Phase, involving screening, evaluating, and eliminating alternatives, and committing to the choice of one or more alternative solutions. The extensive work of Hammond (1996), and others that he reviews, in the study of human judgment, however, reveals that the process is seldom as logical and rational as Mintzberg depicts and is often fraught with uncertainty and tension.

Information seeking has been described as a process occurring in a sequence of stages similar to the decision-making process but with consideration for the affective and

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cognitive experience of users in the process of seeking meaning (Kuhlthau, 1990). The model of the Information Search Process (ISP), developed in a series of studies of library users, incorporated the cognitive with the affective experience common in the process of information seeking. The six stages of the ISP are: Initiation, when a person becomes aware of a lack of knowledge or understanding so that uncertainty and apprehension are common; Selection, when a general area or topic is identified, and initial uncertainty often gives way to a brief sense of optimism and a readiness to begin the search; Exploration, when inconsistent, incompatible information is encountered, and uncertainty, confusion, and doubt frequently increase; Formulation, when a focused perspective of the problem is formed, and uncertainty diminishes as confidence begins to increase; Collection, when information pertinent to the focused problem is gathered, and uncertainty subsides as interest and involvement in the project deepens; and Presentation, when the search is completed with a new understanding of the problem, enabling the user to explain his or her learning to others.

The decision-making process and the information-seeking process are likely to be intertwined in recursive interaction rather than one following another in a neat, formal sequence. Stages of Initiation and Selection in the ISP may correspond to the Identification phase of decision making. Exploration and Formulation stages may be thought of as the Developmental phase. Collection and Presentation may be comparable to the Selection phase in decision making. The ISP brings consideration for the process of interacting thoughts, actions, and feelings in the process of construction to our understanding of the decision-making process in information work. Within the ISP, the user interprets information to construct new understandings and knowledge that add valuable information for addressing problems and making judgments.

### *Sources of Information for Decision Making*

Research into information-seeking behavior in the workplace has mainly concentrated on the sources of information used for decision making and not on the constructive process that underlies the use of these sources. Studies of sources, however, are relevant to this study in that they offer frameworks for better understanding the use of sources by information workers in general, and securities analysts in particular.

A number of studies have revealed the wide variety of sources workers use for gaining information in the workplace (Choo & Auster, 1993; Katzer & Fletcher, 1992). Daft and Lengel (1986) propose the information richness concept to describe the use of a wide range of sources for decision making. Senior managers in high-performing firms have been found to use more varied information sources than those in low-performing companies (Auster & Choo, 1994; Baldwin & Rice, 1997; Daft, Sormunen, & Parks, 1988;

Ginman, 1988, 1990), thus relating information richness to effective business practice.

Aguilar (1967) coined the term “environmental scanning” to describe strategies for providing a wide range of sources of information for decisions and judgments critical to the success of an organization. The framework he developed is still useful for depicting what he described as, “scanning for information about events and relationships in a company’s outside environment the knowledge of which would assist top management in its task of charting the company’s future action” (Aguilar, 1967, p. 1). He described two general modes of environmental scanning: Viewing and searching. Viewing is nonspecific information seeking that can be either undirected or conditional. Undirected viewing involves casual exposure to information, while conditional viewing is purposeful but nonspecific, such as browsing a newspaper. Searching is problem-driven information seeking and can be either informal or formal. Informal searching involves unstructured, cursory check of current facts or data, while formal searching is structured and in-depth directed to a specific problem. Aguilar further categorizes information sources as external or internal, and personal or impersonal.

Choo and Auster (1993) elaborated on Aguilar’s framework of categories of sources and gave examples to illustrate each category. Following are the combination of categories and examples of sources within each category: External Personal, such as customers, competitors, government officers, and business associates; External Impersonal, such as newspapers, periodicals, broadcast media, conferences, industry and trade association publications and communication; Internal Personal, such as superiors, board members, subordinate managers, and staff; Internal Impersonal, such as internal memos, reports and studies, corporate library, and electronic sources. Successful managers draw information from a wide variety of sources and use a combination of personal, impersonal, external, and internal sources (Auster & Choo, 1994, p. 616).

In a recent study, Baldwin and Rice (1997) proposed a framework for classifying sources of information by channels. This classification framework was specifically designed for categorizing the sources used by securities analysts in preparing their reports for clients. Internal channels include: Newspapers read, magazines read, personal files maintained, and other securities analysts consulted. External channels include: company contacts, visits to companies, annual meetings/trade shows, and research report recipients. In addition, institutional resources are delineated that include the use of external and internal libraries. This classification framework is particularly relevant to this case study as it was developed with securities analysts.

### *Complexity and Uncertainty in Information Seeking*

We can gain some insight into the use of sources of information workers, such as securities analysts, by reviewing research and theories on complexity and uncertainty in

information seeking in work situations where new knowledge is being constructed. Complexity theories are based on the premise that the intellectual process involves the construction of cognitive structures regardless of content (Suedfeld, 1994). "Our constructs guide us in selecting information to be processed from the total available, organizing the selected information, moderating and controlling the impact of emotion and motivation upon information processing, and adapting to situational requirements posed by particular tasks" (Bieri, 1971, as cited in Suedfeld, 1994). Kelly's (1955) work in Personal Construct Theory, some of the earliest and best known work in this area of cognitive complexity, formed the theoretical framework for the development of the ISP model and the uncertainty principle for information seeking (Kuhlthau, 1993a). This work views information seeking as a process of construction with uncertainty decreasing as understanding increases.

A number of studies suggest a relationship between uncertainty, complexity, and the use of a wide variety of information sources in more dynamic environments. Daft found that the rate of change in the environment, the degree of complexity, and the amount of perceived strategic uncertainty has a direct impact on information seeking and use in corporate contexts (Daft et al., 1988). Pinelli et al. (1993) found that as technical uncertainty and project complexity increase, so does the use of formal information sources and the use of information that is external to the organization. Hart and Rice (1991) found that more complex tasks within an organization that are nonroutine and unanalyzable involve processing equivocal information and evoke different approaches to information seeking than do tasks that are routine, analyzable, and involve processing less equivocal information. Other work in this area indicates that task complexity and accompanying uncertainty are influential factors in information-seeking behavior in work situations (Bates, 1986; Bystrom & Jarvelin, 1995; Kuhlthau, 1996).

The concept of uncertainty is not a new one for information science. Shannon and Weaver (1949) introduced a limited view of the concept to address issues of signal transmission and reception in electronic communication, on a technical level, that did not encompass the meaning of the message on a semantic level, or its effectiveness on a pragmatic level (Cole, 1993). At the pragmatic level, information processes involve the interaction between information transmitted and the use made of that information by users as interpreters (Artandi, 1973). Artandi suggested that uncertainty in information science may be thought of in terms of information as a measure of uncertainty, and information as a means of reducing uncertainty.

Whittemore and Yovits (1973) acknowledged the limitation of Shannon's theory for information science and recognized the pragmatic level addressing the effectiveness problem: How effectively does the received meaning affect conduct in the desired way? Important questions regarding the impact of information emerge from their research indicating the need for further investigation. They found that

information did not always reduce uncertainty and, in fact, information increased uncertainty in individual cases.

It is clear that situations exist where information presented to us makes us more uncertain of our appraisal of a particular situation. Thus, after the receipt of this information, the value of our decision state is actually less than it was before receipt of the information. This is quite different, of course, from the concept of Shannon and Weaver where information must always reduce or at least have no effect on uncertainty. (Whittemore & Yovits, 1973, p. 230)

Whittemore and Yovits' findings also suggested an affective experience in the individual constructive process of information seeking for decision making, noting that it is the uncertainty involved that makes decision making such a challenging and often agonizing activity. In later work, Yovits and Foulk (1985) identify an affective dimension influencing the process of information seeking as evidenced by what might be called a confidence factor. Confidence was found to increase as the individual's state of knowledge increases. "The confidence which the decision maker has in his current model clearly affects the manner in which his state of knowledge is altered by the learning process and is an important factor in choosing a course of action" (p. 64). In summarizing their studies, Yovits and his colleagues (Yovits & Foulk, 1985; Yovits & Kleyle, 1993) suggest the need for research into conceptual or higher order uncertainty involved in constructing new knowledge and learning.

Studies of the ISP confirm these findings (Kuhlthau, 1993b). Thoughts, actions, and feelings commonly experienced by users within the process of information seeking for an extensive project reveal increased uncertainty in the early stages before formulation of a focused perspective of a problem or topic, and decreased uncertainty, and increased confidence and interest after formulation. Further theoretical articulation of the findings of these studies has been proposed as an uncertainty principle for information seeking which states that,

Uncertainty is a cognitive state that commonly causes affective symptoms of anxiety and lack of confidence. Uncertainty and anxiety can be expected in the early stages of the ISP. The affective symptoms of uncertainty, confusion, and frustration are associated with vague, unclear thoughts about a topic or problem. As knowledge states shift to more clearly focused thoughts, a parallel shift occurs in feelings of increased confidence. Uncertainty due to a lack of understanding, a gap in meaning, or a limited construct initiates the process of information seeking. (p. 111)

The ISP and associated issues of uncertainty, complexity, and construction have not been formally studied in the context of the information worker. The process of information seeking within complex tasks encompasses a constructive process that goes beyond simply striving to reduce uncertainty. In fact, uncertainty associated with more complex tasks may actually increase with new information.

From the information workers' perspective, how does the use of sources enable interpreting and learning, and what effect does experience have on this process of construction?

### *Information Seeking of Securities Analysts*

Securities analysts have been identified as a group of information workers in a highly volatile, information-dependent environment. As Baldwin and Rice (1997) note, Wall Street functions almost entirely on information. Baldwin and Rice provide an extensive review of user studies related specifically to securities analysts, noting recent trends that are changing analysts' patterns of information seeking, such as sector specialization, globalization of markets, and new electronic systems, that increase the quantity of information and the speed of dissemination.

The measure of ranking and productivity to determine an analyst's outcome is applied by Baldwin and Rice (1997). Ranking by the *Institutional Investor* is a standard evaluation of the effectiveness of individual analysts. They explain that within industry categories and investment specialties, individual securities analysts are rated on their performance in each of the following areas: Stock selection, earnings estimates, service and accessibility, and written reports. The All-American Research Team for each industry category is comprised of first, second, and third place, and runners-up.

While ranking is a fairly straightforward measure of outcome, there seems to be some confusion as to what constitutes productivity. The responses of the analysts surveyed by Baldwin and Rice (1997) were "all across the board" in answer to the question of whether they were writing shorter or longer reports, and the number of reports they were producing. A closer look at what is involved in the task of producing research reports of varying length and complexity seems necessary.

Baldwin and Rice (1997) also found that the only individual, as opposed to structural and institutional, characteristic to influence an analyst's effectiveness was the number of years working as an analyst. Their study of securities analysts found that the institutional resources had a significant influence on the information sources and channels that analysts use, and had a direct influence on the outcomes of analysts' information activities. However, individual characteristics, with the exception of experience, had little influence on the information sources and communication channels used by analysts. The role of experience in the outcome of securities analysts' information seeking and use is of major interest in this study.

### **Research Problem**

Research is needed to investigate the information seeking and use of information workers as they provide information for making decisions. The processes of decision making and information seeking may be intertwined in recursive interaction. Studies of information use in the workplace have concentrated primarily on the sources of

information used, not on the process of seeking information. Although research in this area has centered on information sources, some findings raise important new questions related to the process of information seeking.

One important issue drawn from these studies is the different approaches to information seeking related to different types of tasks (Aguilar, 1967; Auster & Choo, 1994; Choo & Auster, 1993). More complex tasks were not only found to lead to the use of more varied sources than routine tasks but were also found to lead to different approaches to information seeking (Bystrom & Jarvelin, 1995; Hart & Rice, 1991; Pinelli et al., 1993). More complex information-seeking tasks related to decision making involving considerable interpretation and construction seem to be associated with increased uncertainty and anxiety (Bates, 1986; Whittemore & Yovits, 1973; Yovits & Foulk, 1985; Yovits & Kleyale, 1993). The number of years of experience of information workers, specifically securities analysts, was found to be an important factor in the effectiveness of information-seeking activities (Baldwin & Rice, 1997).

Studies of information seeking and use in the context of work environments, particularly at executive levels, raise some important questions for investigation within the frame of the research into the ISP. Issues related to uncertainty, complexity, construction, and experience have been touched upon in these studies but only as peripheral issues that arose from the data. When considered within the context of the model of the ISP, some important questions are raised for further exploration.

This study sought to expand the ISP theory by investigating the process of information seeking of the information worker. The basic problem was to explore the information worker's perception of information seeking, particularly related to the experience of uncertainty, complexity of tasks, construction of information, and use of sources, and to study the difference that expertise makes in these perceptions. The goal of this study was to investigate the problem within a case study of one early career information worker with the intention of gaining a better understanding of the influence of experience and other factors related to information seeking and use, particularly those raised by Baldwin and Rice (1997).

### **Methodology**

A longitudinal case study method was used to explore implications of the ISP theory in a work environment of intensive information seeking and use. The work environment of securities analysts was identified as exemplary of a highly volatile information-dependent context. Therefore, securities analysts were considered prime examples of information workers.

One particular securities analyst was identified as an information worker appropriate for longitudinal investigation of changes in an early career employee's perceptions of information seeking over time. In 8 years, the subject had moved from an entry level position to recognition as a



ranked authority in the industry. The work context of the case study subject was the investment industry on Wall Street where he was employed as an analyst.

The longitudinal study was initiated in 1983, when the participant was a secondary school student, and has continued, since then, at 4- or 5-year intervals, providing an excellent opportunity to study the influence of experience (Kuhlthau, 1988). In a previous segment of this study, he had revealed an understanding of the ISP and had integrated it into his approach to information seeking and use throughout his undergraduate years. This 5-year segment of the longitudinal project studied the subject from entry into a career as a securities analyst, shortly after college, to his present position as a ranked expert in the industry. This is, then, a case study of a competent information worker in the category of emerging markets who had achieved sufficient success from entry level to be considered an expert. In the latest interview in this series, he reported that he had been ranked third in his industry category by *Institutional Investment* 2 years prior to the interview, second the previous year, and expected to be ranked first in the near future.

In-depth interviews conducted in 1990 and again in 1995 were taped, transcribed, and analyzed for evidence of uncertainty within the ISP in relation to the securities analyst's perception of the complexity of the task, construction of information, and use of sources. Interviews, conducted by this researcher, were approximately 90 minutes in length, during which time the participant responded to eight questions which served as prompts for discussion about his information seeking and use in the workplace from his perspective. At the end of the second interview, the participant was asked to read the transcript from the earlier interview and comment on any changes he identified in his patterns of information seeking.

Perceptions of the participant in the entry years of his career were compared with those 5 years later. For the purposes of this study, the operational definition of novice/expert was the number of years experience in the field and recognition of expertise by an independent source. In this case, the participant was considered a novice when he had been employed as a securities analyst for a little over 3 years, and an expert, 5 years later, when he was recognized as an authority in the field.

## Results

### *Evidence of Uncertainty Related to Information Seeking and Use*

The participant described the presence of uncertainty in relation to some aspects of his work at both entry level and 5 years later. Uncertainty was manifested by heightened anxiety and a sense of being overwhelmed, and was related to some tasks more than others.

#### *Novice*

As a novice the participant explained that he experienced uncertainty in preparing extensive reports that involved a

dynamic change in his thinking. He referred to these tasks as "the really good ones that you lose sleep over." These projects took an extended period of time. "Those are the ones that are really time consuming because you are changing your entire thinking on an industry." He called this kind of learning "ramping up."

He also noted that his uncertainty stemmed from a perceived need to be right. "You feel anxiety because you are changing your whole view of the world and most people haven't yet. So you wonder is this right? Is this wrong? Is this going to work out? Is this not going to work out? Am I going against the grain here?"

As a novice, the participant acknowledged the need to tolerate the discomfort of experiencing uncertainty. He stated that he not only expects to be overwhelmed at the beginning but "wants to be overwhelmed." He described "becoming comfortable" with the industry after about 4 months as a signal to write the report. He also noted that he felt anxious at the end of a project regarding how his analysis would be received and if his conclusions were right. "The anxiety builds up in seeing how your scenario works out."

#### *Expert*

As an expert, he found that it took about 4 years to feel confident in the industry. However, he continued to experience a sense of uncertainty related to major new projects. He expressed less tolerance for this experience of uncertainty because it signaled an extensive information gathering task ahead. He stated that, "I don't want to be overwhelmed anymore. If I am, it means I have to write a very major industry piece and I don't want to do that." He explained that some projects take him into "new territory" and that "It is very unsettling to have to move out of your element and ramp up on something entirely new again." At this point, although the participant expressed a preference for the confidence and comfort of more routine information gathering tasks, he acknowledged the necessity to occasionally engage in tasks that cause uncertainty and apprehension. Although he expected to be uncertain in some tasks, his tolerance for uncertainty related tasks seemed considerably less than when he was a novice.

### *Relation of Uncertainty to Complexity of Task*

At both points in the participant's career, he drew distinctions between routine tasks and complex tasks. Routine tasks were associated with low uncertainty, while complex tasks or major projects were associated with high uncertainty. However, as might be expected, as a novice he considered more tasks to be complex than as an expert, when most of his tasks were considered routine and part of the normal course of his work. The perception of the complexity of a task, rather than the actual, objective complexity itself, seemed to be the critical factor in experiencing uncertainty.

### *Novice*

As a novice, the participant described his overall task as research. "We would tell investors whether they should buy, sell, or hold the stock. So we would research the company from a financial perspective. We would look at the market they were involved in and try to come up with conclusions on their future outlook, and we would write research reports."

He described his work as involving two types of information tasks. One he called "maintenance" or "soft" research where the basic framework was already there and the task involved updating that research. He described this as "very traditional Wall Street research" where he might be working on as many as 12 mini reports at a time and completed about 60 reports over 3 years. He explained that in these tasks, "you don't go through the entire research process. It is stuff you already know and you cut and paste a lot." These tasks were considered routine.

The second type of task, which he called "pure" research, occurred when "you are trying to get a sense of how an industry is structured." He explained that in these tasks he was trying "to understand what the industry is all about and where it has been and where it is going. It is something that I approached with zero knowledge and I didn't know where it would lead me." He estimated that he had worked on about six reports of this type and that these tasks were "really time consuming because you have to change your entire thinking on an industry." These tasks were considered complex.

### *Expert*

As an expert, the participant described the overall task of his work more clearly than he did as a novice but he did not contradict his earlier explanation. "The overall task is to stay abreast of what is happening and to analyze trends. It takes a couple of years to fully understand the dynamics of the industry and what makes these companies move." Using the image of a "big chess board" he revealed extensive knowledge of interactions within the industry.

He again described his information seeking and use as involving a two-tiered task but this time in reverse order of his earlier description. First, the complex task of "ramping up" on an industry, and second, the routine task of analyzing trends and writing reports on how the company addresses its competitive position relative to other companies in the industry. In the first task, called "a major industry piece to lay the groundwork for ongoing research," he described being "out of my element" and "treading into new territory." He explained that, while he is not regularly involved in such complex tasks, occasionally he is required to address a new industry. The following remarks showed his strong reaction to this type of information seeking task. "I hate complex tasks! I don't have time for complex tasks . . . to go through the whole process of having to add value to clients on a new industry." As an expert, this participant was involved in

about one complex project each year, and was clear about the discomfort and uncertainty associated with a major project of this type.

### *Relation of Uncertainty and Complexity to Construction*

The participant clearly described the need to interpret the information he gathered. At both the novice and the expert level, he was not just reproducing texts or reporting gathered facts but involved in a thoughtful process of construction for presenting "new" information to clients. However, his emphasis was on a different objective at each point in his career. As a novice, he emphasized being "right" in his conclusion. As an expert, he emphasized "adding value to the client's knowledge."

### *Novice*

The participant, as a novice, repeatedly described the need to expand his knowledge base, explaining that he was "getting a sense of what this industry is all about." The following comments pulled from various points in the interview emphasize this theme: "Trying to get a sense of how the industry itself was structured"; "trying to get a sense of what earnings they would derive in the future"; "I try to get a sense of what the market is within each of these segments"; "try to understand the industry and what it is all about and where it has been and where it is going"; and "getting a sense of how these people are reacting to change in the environment and how they are positioning themselves." These comments reveal a desire to understand, interpret, and learn rather than just to gather and report facts.

The six projects that he identified as more complex than the others involved learning or "ramping up" and constructing a "story" to present. He explained that these major projects involved getting "a sense if there is an interesting story that I want to pitch. How has this been pitched before and do I have any new angles that I want to pitch?" He explained that the need to present new information caused anxiety. "You always have to have a fresh angle on things to market. You have to be able to be constructive and that is where the anxiety comes in. You have to have something to say. You have to have an overall perception." He explained that he constructs his point of view in the process of information seeking. "I build conclusions from day one. I just keep changing them as the information rolls in." As a novice, he acknowledged experiencing considerable uncertainty and anxiety associated with extensive construction in the process of information seeking.

A further element that contributed to his experience of anxiety was his perception of the necessity for "being right." Coming up with the "right" answer was an important concern for the novice. In addition, as a novice, the participant was concerned about being misled by "wrong" information. He explained that, "I don't think there is such a thing as too much information but I do think there is right infor-

mation and wrong information. Right information is accurate and proves itself right over time. Wrong information is misleading.”

The participant described his interpretation of the information he had gathered as his story, and explained that he considered his audience’s information-seeking process in his reports. “I simplify my story and provide options for the client, either the general conclusions and general story line or every little point . . . My audience is a client who does not want to be overwhelmed with a complicated story. My job was to simplify it for him as much as possible.” He explained how he provided options for the client so that his report would be accessible on a variety of levels. “The cover page of my report has bullet points. Here’s what I found out, three or four highlights. The rest of the report is expanding on those bullet points.”

The participant explained that after he had formulated his view of an industry or company, through an extensive process of information seeking and construction, he does not change it readily. “It is not easy to sway me on my conclusions on a perception of an industry once I have been working on an idea for a while. My conclusion is not based on one company but relative to everything else that is out there.” Once he had constructed a point of view, he seemed fairly resistant to changing his opinion.

#### *Expert*

As an expert, the participant noted the difference between simply gathering and reporting on facts, and interpreting information to provide new insights. He explained that, “we have gone from being data gatherers to being data providers. My job is not to tell the client to buy or sell but to provide intelligent, insightful information to add value to his knowledge base.”

He described a change in his understanding of his work over the 5-year period. He explained that he is no longer so concerned with being right or wrong, or coming up with the right answer, but with providing valuable information for the client. “The task has changed some from when I first started. It is not to buy or to sell but to add value . . . The best way I can help, particularly my more sophisticated client, is by adding value to their knowledge base . . . The young analyst who is not confident in his industry worries about getting the story right. Now my attention is on adding value.”

The participant as an expert went on to explain changes in his objective and approach from earlier in his career. “You learn to deal with the anxiety of ‘will I be right’ or ‘will I be wrong’ by making sure that whatever research you write, whether it is right or wrong, that it is adding value in the marketplace. Even if it is completely wrong, at least it gets people thinking about an issue that they should be thinking about, and they may not agree with you but they may be thankful that you made them think about it and address that issue with other analysts on the street. I have learned to approach my job differently and to reduce that

anxiety.” Emphasis had shifted to adding valuable information and that had eased anxiety related to coming up with the right answer.

As an expert, the participant explained that he “used to write a lot more but it was a lot less insightful and less value added.” He emphasized other pressures on his time that the younger analyst does not have but noted that when he was ready to write a report he set aside a block of time to concentrate on the task. He explained that, “I know I am ready to put out a report when I look at a company in a way that other people are not looking at it—when I know I have a piece of information that is critical to understanding this company that is not reflected in stock prices yet.” The expert described the “trigger” for getting out a report is not merely the date it is due but the more conceptual “trigger” of having valuable new information.

As an expert, the participant also had changed his view of “wrong information” from when he was a novice. He explained that, “I thrive on wrong information right now. I am living in markets where so many of my competitors put out wrong information or wrong interpretation based on incomplete information . . . What I do love is having wrong information in the marketplace and then coming in saying that is wrong and explaining why . . . It is easy for people to think they have right information when indeed it is not . . . They should be looking at it from an entirely different perspective. So it is not just wrong information, a lot of the time, it is poor interpretation of right information.” The importance of the interpretation of information, not just the gathering of information, was stressed. Confidence in being able to provide valuable interpretation also was clearly expressed by the expert.

#### *Relation of Uncertainty and Complexity to Use of Sources*

The complexity of a task and the experience of uncertainty promoted the use of a variety of sources of information for the participant as a novice and as an expert. At each point in the participant’s career, he identified similar information sources; however, as an expert he had developed discriminating and interactive use of information sources that were not evident when he was a novice. Eight types of sources were identified in his interviews. Following is his description of his use of each type as a novice, and then as an expert, organized by the categories developed by Baldwin and Rice (1997), Internal, External, and Institutional. Internal are those sources within the Wall Street securities business. External are those sources outside of the securities business, primarily drawn from the companies being analyzed. Institutional are those resources available to the analyst in the organization in which he works, such as libraries.

#### *Novice*

As a novice, he was seeking to expand his knowledge of the field. He explains that, “I want to have as much infor-

mation as possible. I want to tap everything that is out there that has anything to do with, or is remotely close to, this research report that I am writing. There is no such thing as wasted research here. If I am reading something in a trade journal, it may not help me with this report but it is going to help me with the next company I pick up coverage on, or I may be picking up an idea for my next report, or it gives me ideas to chat about with clients.”

#### *Internal sources*

*Newspapers and trade journals.* As a novice, the participant explained that he used newspapers and trade journals in the beginning of his investigation of a company “to become more familiar with the business niche they are in.” He referred to a particular database of newspaper and journal articles that he had available on his computer as a “wonderful source” that, “is a good way to pick up a good, clean package of information to start from.” He noted that he looked for “what articles have appeared in newspapers throughout the country in the last 2 or 3 years,” as well as financial statements on the company and who has written research reports on the company. He described searching for a broad range of topics related to the company under investigation in this way, “Some articles are on the industry, some on the company’s financials, some on programs, some are on the scandal management has had some years ago.”

*In-house specialists.* As a novice, he relied on the expertise of other employees and turned to other sector specialists in-house, such as chemical analysts and technicians. He explained that, “One thing I have learned to do is to use the people who are out there, use their knowledge. I do not have to go through the grueling practice of learning everything on my own. I am far more efficient when I can have someone else teach me about it. If I am dealing with a company, for example, that has a small chemical company on the side, I don’t have to go out and learn everything about the chemical industry. I can go to a chemical analyst. No pride lost, just far more efficient.”

He went on to explain how technicians’ knowledge proved helpful. “If I have questions about the stock itself, how a stock moves, how it behaves, and what patterns emerge, I will talk to my technicians, who know nothing about the story, nothing about the company. All they know are the trading patterns of the stock—very important.”

The young analyst checked with the director of research and other bosses while developing his reports, and after a report was completed, but before it was issued. He explained that he worked closely with another senior analyst for 2 years before being assigned companies to cover on his own. “When all of this is finished, I will give it to the director of the research department who will read and give comments. Most of the time the type of feedback I get from the director is how to refine marketing points. Rarely does he disagree with the conclusions. When he does, it is usually for good reason.”

*Reports of other analysts.* Early in a project, he used other analysts’ reports to get their perspective on a company, acknowledging that these are competitors for the same client group. “In the beginning, I go out and read what other analysts have said about this company . . . I want to find out how this has been pitched before and do I have any new angles that I want to pitch. My audience is going to be pretty much the same audience.”

#### *External sources*

*Annual reports and financial statements.* As a novice, he described his use of annual reports and financial reports of companies under review as “completely separate” from the other sources he was using. Financials included balance sheets and interest statements and were also used early in the process of information seeking.

*Company briefings.* He attended weekly information luncheons for analysts given by companies. “I made it a point, whether I was interested in the company or not, to go and listen to their story. That is a way of getting a sense of how these people are reacting to change in the environment and how they are positioning themselves.” His notes from these meetings were useful at a later time for deciding whether to “pick up coverage of the company,” which is consistent with the finding of Baldwin and Rice (1997) that securities analysts relied heavily on company briefings and trade shows.

*Company visits.* Company visits and teleconferences consisting of interviews with the CFO, industrial relations people, and engineers were considered an essential source of information. The participant explained that he would, “ask them to give me their side of the story.” In preparation for the visit, he would, “develop a series of questions on business, products, outlook, visibility of programs.” He explained that these information gathering sessions sometimes took on an interactive dimension. “I would have my view which might not agree with theirs so I would try to hash that out with them. It is very important to understand their perception. I spent quite a bit of time doing that.”

Further evidence of developing interaction in his contact with companies was his practice of sending the company drafts of reports and even copies of notes on conversations, telephone calls, and meetings. He explained the purpose of this practice was twofold: “One, it made us better analysts because we would get good feedback from the firms. Two, it would keep the storyline straight.”

As a novice, the participant also noted developing relationships with company officials as important sources of information on an ongoing basis. He explained that, “I went straight to the engineers and said, explain this business industry to me and what is going on. Some people may not have these contacts. I had a close relationship with those engineers so they were very candid with me. Your report depends so much on who your sources are. It depends on the



TABLE 1. Changes in use of sources with experience.\*

Sources	Experience	
	Novice	Expert
Internal		
Newspapers and trade journals	X+	X
In-house specialists	X+	X
Reports of other analysts	X	0
External		
Annual reports	X	X+
Company briefings	X	0
Company visits	X	X+
Clients	0	X+
Institutional resources		
Libraries	X	X

\* Code for participants rating of sources: 0 = little or no use; X = some use; X+ = frequent use.

sources but it also depends on the perspective of the researcher.”

#### *Institutional resources*

**Libraries.** He described his work as producing library resources rather than using these resources. He explained that he did not use the “library because this is a fairly new industry and little is written on it.” However, he went on to describe producing reports that had an extensive circulation and that actually became library resources. “These reports had a circulation of 7,000 to 8,000 people. They go to all the companies, all the regular clients, all the salesmen and brokers, and then to a whole series of engineering and library resources.” As a young analyst, he occasionally returned to his financial textbooks to address what he called a “technical question.”

The primary objective for using these sources of information was to write research reports on companies, but, as a novice, the participant identified the important secondary objective of building his knowledge base. He explained that he asked a twofold question in determining the relevance of the information he encountered. First, “what information am I going to use for this report?” Second, “what information am I going to use in the future?” He further explained that, “all the information I gather I keep, because at one point or another I am going to need it. Tons of stuff is redundant that you toss out, but you do come across some good pieces of information that you know you will use sooner or later.”

#### *Expert*

Five years later, the participant used a similar range of sources but there were important changes in his ratings of these sources. Some were used more frequently while others were rarely used, as shown in Table I. As an expert, he also used sources in more discriminating and interactive ways.

#### *Internal sources*

**Newspapers and trade journals.** The participant, as an expert, explained that he used a few selected journals for

keeping up to date. There were “a few good ones for what is happening on the U.S. side of business, but there are no trade journals” in the emerging markets he was covering. He noted that newspapers were “not a big source” because they typically lagged behind the information he needed in a volatile market. He explained that analysts’ information is usually more current than that reported in newspapers and that, “to a large degree, we are on the leading edge of the information flow, so what you see in the press is really stemming from our research.” He acknowledged that although it was important to keep ahead of the information being reported in newspapers and journals, they were still a useful source for “reviewing industry-wide information.”

**In-house specialists.** As an expert, the participant explained that he worked on a research team of 14 or so analysts who cover a particular sector of emerging markets. He also noted that he has a young analyst assigned to him as an assistant who he is grooming as a partner.

“The only people I send my research to, to read now, is the company that I am writing on, to make sure that I am not misrepresenting their position in the industry. Before we put out a major research report it does go through a committee here. That tends to be helpful. But rather than rush to get the information to them and sit and wait for their approval, I supply the reports to clients immediately.”

**Reports of other analysts.** As an expert, the participant described being highly selective in his use of the research of other analysts. He explained that, “sometimes a competitor comes out with a very important piece of research and the market is very fast about absorbing it. It is very easy for my competitors to find out what I have been saying or for me to find out what they are saying. But I don’t want to know what a lot of my competitors are saying. I have a particular and peculiar way of looking at the companies in this industry and very rarely do I find myself using the information that my competitors produce. I don’t trust anyone else’s information. If I were a younger analyst coming up I would read it but now it is not useful.” This shift is in line with the findings of Baldwin and Rice (1997) that the analysts did not want to have their judgment clouded by what someone else is saying. He did note, however, that “In the beginning of an extensive project, I see what some of my competitors who cover the stock already are saying about it and how they approach it.” He also noted that it was quite easy to obtain reports written by other analysts.

#### *External sources*

**Annual reports and financial statements.** As an expert, the participant identified annual and quarterly reports and financial statements as a source of such importance that he had initiated the development of a database of financial information drawn from these reports to track companies under review. He described the database as having “the

balance sheets, income statements, cash flow of every company in this area that trades publicly.” He explained that it had taken 3 years to develop and that it had been published with quarterly updates. He also noted that he used it “extensively.”

*Company briefings.* As an expert, the participant did not mention the company briefings that he had found so useful for building his knowledge base earlier in his career as a source of information.

*Company visits.* As an expert, he described company visits as an essential source of information. “The bulk of information that I need, I have to go directly to the companies for, because it is not public, it doesn’t exist, it hasn’t been written before.” He explained that there is no written source that can take the place of an on-site visit. As he did when he was novice, he described being well prepared for these visits. “When I go out and visit the company to meet the management, I already know quite a bit about it just from tracking it over time.” He viewed this as broad-ranging and ongoing information gathering activity. “One way of gathering information is talking to as many of these companies and as many of these parties as possible.”

The relationships he was initiating as a novice continued to develop. As an expert, he explained that the “relationships you build with senior and middle management are built over time, are based on trust.” He further noted that it “requires a lot of work, a lot of traveling, and spending a lot of time with them.” He stated that he goes to the country where many of his companies were located about once every 2 weeks, and in between kept in touch through telephone conversations and memos. He emphasized that, without these relationships, he would not be in a position to fully understand the industry he was analyzing. He went so far as to say that he was considered one of “them” by the companies he covered.

*Clients.* As an expert, the participant identified a source that he had not mentioned earlier in his career. This new source were clients who own the stock and have “a feel for how the stock moves.” He stated that his main clients were institutional investors such as insurance companies. He explained that these clients “are a huge information source” and that he engages “in a two-way conversation about what is worrying them and what is they are focusing on.”

#### *Institutional resources*

*Libraries.* The participant stated that he rarely used libraries but, on certain occasions, they had been very useful to him. He gave a few instances of when he used a library to gather information for his work. One was to “understand the political scheme of things in the country” he was working in. Another was when he needed to find out some general information about a country newly assigned to him.

He explained that, “If I need to ramp up on a country really fast, one of the things that I do is to go to the library and use the information systems. I read up on everything that has been published on that country in major trade journals in the last 6 months or a year. That is the only time I go back to the library to use that type of information. For example, what I did recently was to use the library to understand a particular sector and what is going on now to prepare this company report. I wanted to get a better sense of what is happening in farming in that country. It did help to go back to the library and look at some of the farming articles that have been written.” However, he differentiated between information he was gathering for writing reports and this type of background information. “That was for my own information. It doesn’t get published or get translated into research. It is mostly for ramping up on an industry or a country that I would use that.”

#### *Role of Mediators*

At each point in the participant’s career, when he was asked how an information professional could be of help, he responded that the biggest problem for an analyst is to produce clearly formulated research. As a novice, he explained that, “The biggest qualm that directors of research on Wall Street have with research analysts is that they take too long. I have friends in the industry who can’t bang out research reports. I have friends who have been tracking an industry for a year and have not written it up yet and have not picked up coverage of any companies.” As an expert, he stressed the same problem and identified a lack of understanding of the process of research as the basis of the problem. “Research directors complain that their analysts don’t write enough . . . One of the things I see on Wall Street in research departments, and even in some of the corporate financial departments, is the whole problem of being self conscious about the research process and getting a paper out, and how to get rid of the anxiety that goes with writing a research paper . . . For us, it is really critical because we work under very tight time constraints. A lot of paper flow has to go out and, in many cases, there is a direct correlation between paper flow and transactions generated for a firm.”

He suggested that one way to help might be to make research directors aware of the process of doing research. He particularly emphasized working with “young analysts to make them conscious of what the research process is . . . There are some very basic stumbling blocks that you should be aware of . . . It is really not very complicated, but some people don’t pay attention. A lot of people have a very hard time.”

Another suggestion made by the participant was to teach the research process in business school. He explained, “If you go to business school you will find that this isn’t taught. A lot of the focus in business school goes on learning to do team work so that you can get things out fast. But the fact is that when you go out in the marketplace, a lot of time we

can't work in teams. A lot of the weight falls on your own shoulders. You have to do it yourself. How do you deal with that anxiety? How many courses on writing for business don't address the issue of the thought process and the emotional process that one goes through in getting out a research paper, or getting out written material, or getting out a report and how to deal with it?"

Summarizing an area where information professionals might be of help, he stated that, "The best way to help us, I think, is to help us to get it on paper because a lot of good analysts understand the industry and have great insights into the industry but it just doesn't go on paper. Or by the time it goes out on paper it is not transaction-oriented material. It is a day late and a dollar short. That's where I think people on my side of the business need the most help."

## Discussion

The major research question addressed in this case study was: What is the early career information worker's perception of the relationship of the experience of uncertainty, complexity of the task, construction of information, and use of sources, and how do these perceptions change over time with more experience?

### *Uncertainty in Information Seeking and Use*

Uncertainty was manifested by heightened anxiety and a sense of being overwhelmed. The participant described the presence of uncertainty in relation to particular aspects of his work both as a novice and as an expert. As a novice, he showed considerable tolerance for uncertainty, stating that he actually "wanted to be overwhelmed" because he knew that he had much to learn about the industry. In many projects, he was starting with little knowledge and uncertainty was associated with his lack of knowledge. In addition, he was anxious and uncertain about arriving at the right answer in his information seeking.

As an expert, he explained that he still felt unsettled over projects that took him into "new territory." He experienced uncertainty less often than the novice but noted that uncertainty signaled a major project that would require an extensive amount of work. Although he expected to be uncertain in some tasks, his tolerance for uncertainty related tasks seemed considerably less than when he was a novice. This may have been due to the pressure of additional responsibilities, as noted in Baldwin and Rice (1997), that left little time for the sustained work required in major projects.

### *Uncertainty and Complexity of Task*

Complex tasks were associated with uncertainty by the participant at each point in his career. However, it was his perception of complexity that was associated with uncertainty, not the complexity of a task itself. As one would expect, as a novice, he perceived more tasks to be complex. However, as an expert, he continued to experience uncer-

tainty in the early stages of the ISP in tasks that he perceived as complex. He was involved in at least one major project each year that he described as complex, and was clear about the discomfort and uncertainty associated with such a project. At each point in the participant's career, he drew distinctions between routine tasks and complex tasks. Routine tasks that involved monitoring and maintaining ongoing projects were associated with low uncertainty, while complex tasks that involved learning and constructing something entirely new were associated with high uncertainty. The perception of the complexity of a task, rather than the actual, objective complexity of the task, seemed to be the critical factor in experiencing uncertainty.

### *Learning, Interpretation, and Construction*

The learning, called "ramping up," involved extensive construction within the ISP required in complex tasks. As a novice and as an expert, the participant was actively interpreting the information he was gathering. His comments reveal a desire to understand, interpret, and learn rather than just to gather facts. As a novice, he identified six projects as more complex than the others that involved learning and constructing a "story" to present. Clearly he was not merely reporting facts or reproducing texts but constructing new information to present as a cohesive "story" or narrative. He explained that he constructed his point of view in the process of information seeking by building his conclusions from the very beginning and changing his view according to the information he collected.

However, his emphasis, as a novice, was on being "right" in his conclusions and seeking the right answer. As an expert, his objective had changed significantly. Rather than seeking to be right, his aim was to add value to the client's knowledge. He explained that he understood that what seems to be wrong information is often the result of poor interpretation. As an expert, when he came across something that he considered wrong, he saw it as an opportunity to add value by presenting his own interpretation.

As an expert, he had developed two approaches to his work that aided him in learning and forming interpretations to present in his reports. He spent considerable time on gaining an understanding of the perspective of the market of the company he was analyzing. Rather than just forming his own view from the outside, he attempted to gain an insiders view from the company perspective. The other important factor was his overall understanding of the market, not just based on one company but incorporating what he calls "everything else out there." These two elements had evolved over time as fundamentals underlying his reports. He explained that he knew that he was ready to present a report when he had developed an interpretation about a company that somewhat different from that of other analysts. He strived to construct an understanding of the company that had not been reported on and would be considered new information. His primary aim was to add value to the

client's knowledge with some new information or new interpretation of existing information.

### *Sources*

The participant used similar sources as a novice and as an expert with more, varied sources being used in tasks that he perceived as complex. However, he was more discriminating in his use of sources as he gained more expertise. This was particularly noticeable in his use of internal sources. As a novice, he used internal sources, namely newspaper and trade journals, in-house specialists, and reports of other analysts, to gain general background information that would increase his knowledge of the industry. However, as he gained experience and knowledge, he became much more discriminating in his use of these sources. As an expert, he had identified specific trade journals that he considered useful, but, for the most part, he explained that he needed to be ahead of what was reported in newspapers and most journals. As a novice, he had found it helpful and efficient to have an in-house specialist teach him about some aspect of a company that he needed to know about. However, as he gained more knowledge about the industry, he was less dependent on in-house specialists, such as technicians and analysts specializing in other markets. As a novice, he had read other analysts' reports to get a sense of their opinions on a company, but, as he gained more experience, he was very selective in his reading of other analysts' research. He explained that he did not want to be distracted by other analysts' opinions, which is in line with findings by Baldwin and Rice (1997).

Another important change, as he gained more experience, was increased interactivity with his information sources. Interactivity was particularly noticeable in his use of external sources, namely annual reports, financial statements, company briefings, and visits. Annual reports and financial statements were an important source at both points in his career. As a novice, he described these as separate from his other sources and important for gaining a view of a company in preparation for an on-site visit. However, as an expert, he had initiated the creation of a database of financials taken from annual and other reports of the companies in the industry. He noted that he used the database "extensively." He continued to develop and refine the database and had begun publishing with quarterly updates.

Feedback was an important underlying theme in his use of external sources. He had built on the relationships with management of the companies he covered and kept an ongoing conversation with them through visits, telephone calls, memos, and reports. Early in his career, he sought to understand a business from the company's perspective and to obtain feedback from the company to "keep the storyline straight." He developed contacts with management early on, and over time, these became established relationships that he described as being based on trust. As a novice, he considered company briefings as an important source of information, while as an expert, he rarely attended company

briefings. As he gained experience, he relied more heavily on company visits, where he had established relationships with junior and senior management, than he had earlier in his career. He viewed company visits as a broad-ranging and ongoing information gathering activity.

Over time, his clients had become an important source of information that he did not have as a novice. He had developed relationships with clients that had proved to be what he called "a huge source of information." As an expert, he identified clients as a major source of information because many of them followed the stock closely and had insights that were valuable and difficult to obtain. He explained that, in conversations with clients, he would find out what they were worried about and what they were focusing on. Again, the interactivity provided feedback that increased the participants effectiveness.

Increased discrimination and interactive use of information sources were a noticeable change in the participants approach to information seeking as he gained more expertise. He explained that his reports depended on his sources but also his perspective as a researcher.

The library was used for getting background information in a new area at both points in his career. However, the library was not considered a major source; that is consistent with the findings of Baldwin and Rice (1997), that libraries were underused. When pressed to explain his use of the library and why it was not judged to be an important source, he noted that he only used the library when he needed background information to increase his own understanding and not necessarily for something he would directly report on. He differentiated between information he was gathering for writing reports and this type of background information. He noted that he needed this kind of information when he needed to learn about an industry or country that he was not familiar with. He needed this kind of information for those major projects for which he needed to do considerable ground work. As a novice, he had used the library more frequently because he had identified about six projects that required this type of information, while as an expert, he identified only one project a year that called for extensive background information. He explained that this was time consuming and somewhat tedious in light of all of the other responsibilities he had assumed in his work. This type of information does not get translated directly into his research reports.

### *Role of the Information Professional*

The information professional did not seem to have a role in the information seeking of this securities analyst. The logical area where a mediator might help would be in information provision for complex tasks. However, evidence that it was not necessarily the task itself but the user's perception of the task that determines complexity complicates the mediator's role. Ways to diagnose workers' perceptions of an information-seeking task may need to be



developed as a first step in helping the information worker in complex tasks that involve uncertainty and construction.

When asked what would be helpful, the participant did not describe a traditional role for a mediator in the information seeking. He referred to the difficulty many analysts had in writing reports and suggested that it would be helpful for them to become aware of the process involved in research. He indicated that it is this process that these information workers need help with and that they are being tripped up by the process. New roles for information professionals may lie in developing ways to engage in the ISP of information workers.

He suggested that one way to help might be to make research directors aware of the process of doing research. How many courses on writing for business do not address the issue of the thought process and the emotional process that one goes through in getting out a research paper, or getting out written material or a report, and how to deal with it.

## Conclusion

This case study provided an excellent opportunity to gain insight into some of the questions raised in prior, more quantitative, studies of information workers and securities analysts. By studying one analyst's perceptions of his information seeking and use over an extended period of time, a personal explanation is offered of how his perceptions of his work changed with experience. This qualitative study adds a longitudinal, insider's dimension to the more quantitative findings of large scale survey study. Taken together, these approaches offer a fuller picture and better understanding of the actual information seeking and use of this group of information workers. Although the findings from this study cannot be considered as describing information workers' process of information seeking in general, or even that of securities analysts in particular, they contribute a critical dimension that reveals the underlying rationale of the quantitative findings. This combination of quantitative and qualitative approaches has great potential for gaining understandings to a problem that exclusive use of either approach cannot achieve. A detailed description and example of this methodology approach is described in *Seeking Meaning* (Kuhlthau, 1993b).

This study of the relationship of uncertainty, complexity, construction, and sources in the ISP revealed some important differences in a worker's ability to provide valuable information to an enterprise as he gained more experience. The theoretical framework that information seeking is a process of construction, as described in the research on the information search process, offered an opportunity for gaining new insight into the worker's perspective of the interpreting, learning, and constructing involved in information use. We need to gain a better understanding of the variety of projects and tasks that involve information workers and how these workers use information to meet a different goals. Further research is needed that goes beyond studying what

categories of sources are used by information workers, to studying how and why these sources are used to accomplish a wide range of projects and tasks.

Finally, libraries need to change to respond to new information environments. There are many new ways that libraries can contribute that may not be considered within the realm of traditional services but are essential emerging services. Baldwin and Rice (1997) propose developing a virtual library that would be available to securities analysts anytime and anywhere. One obvious way to contribute would be to become involved in the development of databases of financial and other company information that securities analysts in this study, and the Baldwin and Rice study, have indicated that they are attempting to design. Another important contribution is in providing the critical background information at the initiation of a project that this case study revealed as the primary way the library was being used. This area of service could be highlighted as a major part the library plays in developing new projects. An important new area for the library was indicated in this case study. The participant stressed that the most difficult part of research was the intellectual and emotional process that is frequently misunderstood and ignored. Librarians can play an major role by expanding services to support the information search process and, in this way, become an active part of the research effort. The challenge before librarians, as information professionals, is to respond to the critical task of providing value-added information in a volatile, rapidly changing information environment.

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