

MODELING THE INFORMATION SEEKING OF PROFESSIONALS: A GENERAL MODEL DERIVED FROM RESEARCH ON ENGINEERS, HEALTH CARE PROFESSIONALS, AND LAWYERS

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Drawing upon existing research and previous attempts at modeling the information-seeking behavior of specific professional groups, this article posits an original model of information seeking that is applicable to all professionals. The model was developed through a careful analysis and interpretation of empirical studies on the information habits and practices of three groups: engineers, health care professionals, and lawyers. The general model and its six major components are presented in detail. These six components are (1) work roles, (2) associated tasks, and (3) characteristics of information needs and three factors affecting information seeking: (4) awareness, (5) sources, and (6) outcomes. In turn, each component contains a number of variables that are described with examples from the literature. The complexity of the information-seeking process is conceptualized in terms of the interaction and simultaneous occurrence of the model's components and variables, including a feedback mechanism. The article concludes with suggestions as to the potential usefulness of the model.

Background

How people find and use information in the course of their daily work has been a topic of great interest to library and information science (LIS) scholars and is an area of research that has been extensively developed for several decades. Beginning with early studies primarily about scientists and the practice of science [1-3], researchers demonstrated that, rather than being remote, impersonal, and rigid, scientific research was actually communal, reflecting a strong interpersonal network of interconnected scientists. It has also been shown that in these networks there were both formal and informal channels for information ex-

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change and that frequently scientists themselves considered the informal channels to be equally or more important than the formal in their information seeking. These findings from early studies of scientists were later applied to the information-seeking behaviors of scholars in a wide variety of disciplines [4-6].

By the late 1970s and early 1980s, LIS researchers interested in the need for, and use of, information in daily work had expanded their inquiries to include other types of professionals beyond scientists and scholars. The term "profession" is used here in the classic sense to mean those service-oriented occupations having a theoretical knowledge base, requiring extensive formal postsecondary education, having a self-governing association, and adhering to internally developed codes of ethics or other statements of principle [7]. Groups exhibiting some or all of these criteria would include doctors, lawyers, teachers, clergy, nurses, physiotherapists, librarians, accountants, and engineers.

The growing interest in the information-seeking processes of professionals came about for several reasons. First, this area of investigation was a natural outgrowth of previous research on scientists and scholars. Second, commercial database vendors were already developing services tailored to particular professionals but lacked understanding as to whether such services would actually meet the real-life needs of daily practice. More focused and detailed research into the information required and used by professionals was sorely needed. Finally, by studying professionals working within diverse environments, LIS scholars may advance the theoretical analysis of information-seeking processes. In particular, researchers sought the answers to certain key questions, including, How does the information-seeking behavior of professionals resemble or differ from what is already known about scientists and scholars? When, and for what purpose, do professionals seek information? How does the need and search for information influence the effectiveness of the professional in providing service? What barriers do professionals perceive in their search for, and use of, necessary information?

To answer these questions requires a clear understanding of how the work of various professionals differs from that of other groups studied and from each other. For many scholars, the *raison d'être* is the pursuance of knowledge, and much of their working time is devoted either to current research or to planning for future research. Thus the ultimate outcome of their work is the production of knowledge. Professionals, on the other hand, primarily produce services. The work of the professional is necessarily more task-oriented, continually requiring the setting and achieving of goals to provide service to clients in the most efficient manner possible.

Because of their different orientations and products, a model of the information seeking of scholars is not likely to be easily generalized to professionals. The latter face different constraints in their work and have access to alternate sources and types of information. Another confounding element is that the professional frequently plays many distinct roles throughout any given day, including not only those having to do with the provision of specific expertise and knowledge but also roles related to managing, counseling, supervising, planning, and even certain types of research. Within the context of the professional's organizational situation, the information needed and sought may vary with each role enacted. This variation considerably complicates the information-seeking behavior of professionals and has made the development of a general model that could be applied to different groups more difficult to achieve.

To date, the attempts that have been made to model the information seeking of professionals have been limited to specific groups. For example, Alina Gralewski-Vickery [8] proposed a detailed model of information seeking and use related to the work of engineers. However, as the research in this area continually expands to include more types of professionals (including physiotherapists, accountants, nurses, CEOs, and systems analysts), it is obvious that a more comprehensive model is required to advance the theoretical discussion of information seeking as a process and also to offer insights and suggested solutions to the real and pressing need for more relevant and more timely information currently experienced by many professionals in their work.

Purpose and Outline

The overall goal of this article is to review the research about the information seeking of three different groups of professionals, to synthesize and interpret the findings from a wide variety of representative studies on these groups, and finally to propose an original model of information-seeking processes that would be applicable to professionals working in any field.

The discussion to follow is organized into several parts. The next three sections provide an overview of literature concerning the information-seeking behavior of engineers, health care professionals, and lawyers. These groups were chosen because there is a body of scholarship about them and because they represent divergent types of professions—one being focused primarily on technical products and the other two dealing with human clients. The review draws out important themes or trends evident in the literature, stressing commonalities that are later used in

the development of the proposed model. It should be pointed out that while the review is generally representative of research on these groups of professionals, it is nonetheless selective. A comprehensive review of the literature relating to the three targeted groups is beyond the scope of this article.

The literature review is followed by a discussion of previous attempts to model the information-seeking behavior of professionals, noting that many of these earlier models are either specific to a particular professional group or model only part of the information-seeking process. With the limitations of earlier models in mind, our general model is introduced, and each component of the model is presented in detail, illustrated with examples of empirical studies on the three professional groups under consideration. The article concludes with a discussion of the implications of the model and suggestions for future research.

Profile: Engineers and Their Information-Handling Habits

Engineers are the first group of professionals whose information-seeking patterns are considered. Although they share professional status, organization, and general training, engineers are largely specialists, trained at a university level in the numerous subspecialties of engineering (for example, civil, electronic, petroleum). Engineers work in a vast range of work environments, from the small consulting firm to the large research corporation. Within these various settings, individuals assume, often concurrently or at different stages of their career, a variety of functions, including research and development, design, testing, manufacturing and construction, sales, consulting, government and management, and teaching [9].

The ways engineers seek and use information has been extensively studied in the last thirty years. Recent useful guides to that vast literature include Thomas Pinelli et al. [10] and Don King et al. [11]. Unfortunately, a substantial part of this research does not establish a clear distinction between engineers and scientists, the two groups being lumped into one loose category of knowledge workers. Although the line is fuzzy in some research-intensive environments where engineers and scientists collaborate closely, the emphasis of engineering work is generally on solving technical problems. The result of this work tends to be a product, a process, or a service rather than new knowledge (in the form of a paper or report) per se. In fact, one study shows that engineers need far more information than they generate [12]. In one depiction of information processing in science and technology [13], scientists use information primarily to produce similar, verbally encoded, information (that

is, research papers, discussion), while engineers consume information primarily to produce physically encoded information (or things), with documentation being a by-product. Interestingly enough, some of the earlier studies of information needs and uses of engineers and scientists demonstrate how these groups differ in terms of types of information sources used, time spent seeking information, use of library materials, and how the information needed is located. For instance, Richard Rosenbloom and Francis Wolek [14], confirming results of earlier studies, show that engineers rely much more on colleagues and internal sources for information, while scientists depend more on the published literature and sources outside their own organization.

Repeatedly, studies of information seeking in engineers have revealed that oral communication is predominant, just as is the reliance on co-workers' and supervisors' knowledge. Libraries are little used and, instead, engineers rely on personal files, personal knowledge, and personal experience. When written sources are consulted, they consist of textbooks, technical reports, catalogs, and trade journals rather than scholarly journals and books, conference papers, and other external sources [12, 13]. This pattern holds whether one considers engineers active in universities or R&D industries, or who are practitioners. Unfortunately, few studies have focused on the latter group, which actually constitutes the bulk of active professional engineers. Engineers, like other research professionals, spend a considerable amount of time seeking and manipulating information, with estimates ranging from 20 percent up to 80 percent of their work hours (see [15]).

The numerous work roles assumed by engineers can lead to different information needs. Engineers in research and development—as well as those active in design, testing, manufacturing, and construction—work with a specific objective in mind: the particular product or device to be delivered to the client. The work can be contractual or for in-house use, is always constrained by time, and seems most often conducted in an atmosphere of secrecy and confidentiality. Generally working in small teams, engineers will perform a number of tasks associated with each role or function. For example, the design and testing of a particular device will consist of tasks such as determining the specifications for the design, drawing plans and blueprints, simulating product behavior, and developing, documenting, and implementing the testing procedures. Needless to say, the information needed will have to be accurate, up to date, and reliable but also original. This need for originality explains why the journal literature is considered largely irrelevant [12]. In this case, information sources will be primarily internal (for example, internal reports, drafts, benchmark tests results).

The consulting role leads to a different set of tasks, such as contact

with clients, interviews, presentations, fieldwork, and supervision of other engineers and technical personnel. While accuracy and currency will still remain a concern for the consulting engineer, awareness of changes in the specialty is paramount, and therefore external sources of information, such as market information about vendors and customers, often will be consulted. In general, consultants are among the biggest consumers of information in engineering [16].

More senior engineers, often at latter stages of their career, may take a managerial or administrative role. Tasks associated with this capacity may entail acting as group leader, finding new contracts and customers, planning budget and personnel, coordinating work, making policies, and interfacing with the different levels of government. The senior engineer will need varied information, both internal and external, notably on new regulations and technologies, personnel records, and business and general economic information.

These few examples illustrate the interlocking of roles and tasks as a determinant of information need. However, a plethora of other factors ultimately affect the overall information-seeking process. Furthermore, these other factors have been abundantly documented in numerous studies of engineers. For instance, in the research environment of an R&D firm, information needs and sources vary with the stage of the research endeavor [17]. In the initial innovation phase of idea generation, it will be important to build awareness of "what's out there" by monitoring journals for opportunities and threats. Later, after a project definition phase, an R&D phase, and a design phase come the production and marketing phases. The latter involves mostly external information on market situation and economic situation and on the sociopolitical climate.

More recently, researchers have been interested in engineers' use of electronic databases and various information technologies in fulfilling their information needs. They have found that these professionals, perhaps surprisingly given their technological background, fail to take advantage of electronic information access and retrieval [18]. Another study identified two principal factors that inhibit use of those resources: information systems are considered awkward and difficult to use, and they do not directly meet the problem-oriented information needs of engineers [19]. The mismatch between information systems used and information needs of R&D managers is of particular concern since it does not adequately support engineers' complex decision-making processes [20]. Consequently, new information products and services need to be developed [21].

In a classic study, Peter Gerstberger and Thomas Allen [22] demonstrated that there exists a strong relationship between accessibility and

frequency of use, on the one hand, and between the degree of experience with a channel of information and both perceived accessibility and ease of use on the other. While both perceived quality and accessibility influence the choice of a first source, the latter stands out as the single most important determinant of use. Other studies also concurred that accessibility and familiarity are more important than perceived quality and that, in some cases, quality will be sacrificed in order to minimize the cost of acquiring information [23].

Finally, although there is little research as yet to substantiate it, existing studies do suggest that the information needs of engineers, and the sources of information used, vary according to career stage, from student and junior engineer to intermediate and more senior stages [8].

In such a short overview of an extremely rich literature, elements of the information processes involving engineers can only be painted with broad strokes. However, the examples provided clearly show that work roles and tasks largely determine information needs, while a wide number of factors ultimately affect which sources and types of information are used in a given situation. The information-seeking behavior of engineers is, therefore, the result of a complex interplay of variables, from job function, work environment, qualifications, discipline, and career stage to accessibility of information, its ease of use, and technical quality.

Profile: Health Care Professionals

The second group of professionals under consideration are health care professionals, including, nurses, physicians, and dentists. As a "program by which health care is made available to the population and financed by government or private enterprise or both," a health care system comprises three elements: "(1) personal health care services available to individuals and families through hospitals, clinics, neighbourhood centers, and similar agencies, and in physicians' offices and the clients' own homes; (2) the public health services needed to maintain a healthy environment; and (3) teaching and research activities related to the prevention and treatment of disease" [24, p. 650]. Within this system there exist many different groups of professionals, including physicians, nurses, administrators, pharmacists, dentists, dieticians, speech pathologists, and physiotherapists—to name a few, which can be further classified by area of specialization, such as community health or gerontology. These professionals work in a broad range of settings, from hospitals and public health units to private practices and universities, all of varying sizes. Some even hold joint positions, such as dentists who have a private practice and also teach at a local college. This section reviews the re-

search literature on the information seeking of nurses, physicians, and dentists.

Nurses

Nurses make up the largest group of health care professionals [25] and "practice in the widest variety of health care and health related positions imaginable," from hospitals, community health settings, and entrepreneurial firms to governmental positions where they review and monitor care [26, p. 1042]. The practice of nursing is defined as "including the promotion and maintenance of health, prevention of illness, care of persons during acute phases of illness, rehabilitation or restoration of health, and where all of these are not possible helping to sustain the individual through a dignified death" [26, p. 1042].

Within this framework, the primary focus of many nurses is patient care, a role that creates tasks requiring information deliverable in specific formats. For example, Jennifer Blythe and Joan Royle [25] found that nurses sought two broad types of information: "Information to help them make decisions about the care of individual patients; and information about broader topics within nursing," with most questions relating to patient care. For routine questions, nurses usually sought information from a single source, including both interpersonal (for example, other nurses, a physician, or a pharmacist) and print (for example, patients' records, the Kardex,² and laboratory results). But for non-routine questions, they would often use multiple sources. Blythe and Royle explained that nurses sought "clear directions from knowledgeable oral sources or quick reference material because the information-seeking was either routine and task-oriented or was triggered by patient needs that required quick decision making" [25, p. 434]. Further, because nurses must remain near their patients, they require information sources that are accessible from the unit.

Other studies confirm Blythe and Royle's finding that nurses primarily seek patient care from knowledgeable colleagues and ward-based sources. In addition to requiring patient-specific information, Sheila Corcoran-Perry and Judith Graves [27] reported that nurses seek institution-specific information and thus spend a lot of time "tracking equipment, reports and people, locating hospital policies, and gathering information related to patient admission, transfer and discharge." Also, nurses require supplemental information for administrative tasks and unit/personnel management. Despite saying that they preferred inter-

2. A system used by nurses in clinical practice for maintaining a summary of the patient's identification, treatments, tests, and a plan for nursing care. Used primarily for facilitating communication about a patient's status between members of a health care team.

personal sources for information, nurses' behavior indicated that they used verbal and written sources with equal frequency. By far, the biggest problem reported in seeking information was lack of availability, followed by "too much information and information that was in the wrong place, incomplete, inaccurate, inconsistent, illegible, or difficult to understand" [27, p. 125].

A British study undertaken by Maurice Wakeham sought to "identify the kinds of information sought by practising nurses and student nurses and to investigate their information seeking behavior with special reference to their use of libraries" [28, p. 133]. In brief, the findings showed that 90 percent of respondents sought information relating to patient care and for their own personal interest at least monthly. Sources were chosen based on the reason for needing the information; for example, patient care needs prompted nurses to consult most frequently colleagues, ward-based information, and their own journals, while for course work, they used libraries and information services. Wakeham also emphasized the importance of accessibility and availability when choosing a source.

Nurses' low library use is documented in several studies. Linda Bunyan and Evelyn Lutz [29] showed that, while nurses constituted 31 percent of the hospital's staff, they represented only 6 percent of the library's users and that most of their questions related to management issues instead of patient care. While 78 percent of the nurses reported a favorable attitude toward the library, the majority were "unfamiliar with most of the services and resources available" [29, p. 224].

Physicians

The quantity of research on physicians far outweighs that on any other health care group [30]. The following discussion highlights some key findings, but Stephen Osiobe [31], Larry Gruppen [32], and Anita Verhoeven et al. [33] are recommended for more extensive reviews.

While it may seem obvious that physicians have information needs (especially relating to patient care), it may not be so clear that those needs and uses may vary widely from one physician to another. Theresa Strasser [34], in one of the earliest studies, found definite variable-related differences among physicians. For example, surgeons had greater interest in routine patient care, while for pediatricians and family practitioners, it was psychological aspects of disease. Whereas articles in professional journals, colleagues, and books were the most widely used sources in general, family practitioners and obstetricians/gynecologists used colleagues more than other sources. Use of library sources increased with recency of training, and consultation with colleagues decreased as physicians grew older. This last point was confirmed by

E. Ray Stinson and Dorothy Mueller [35], but a recent study by John Ely et al. [36] found it insignificant.

Stinson and Mueller's [35, p. 140] observation that physicians' "use of various information sources [is] related to such factors as their type of practice, speciality, location of practice, professional's age, and the size of their primary hospital" was confirmed in later studies by Larry Gruppen et al. [37], Steven Woolf and Dennis Benson [38], and John Ely et al. [36]. Through studying primary care physicians, Gruppen et al. [37] observed that internists selected journals and textbooks most often and that family physicians relied more on informal consultations with colleagues. In the Stinson and Mueller [35] study, urban professionals used colleagues more than those in other areas, and professionals in institutional practice relied on colleagues more than those in solo or group practice. Further, unsolicited medical literature was used more by general practitioners, and professionals in solo practice used local medical libraries less than those in institutional or group practices; books were more heavily used by physicians with less than ten years' experience practicing. Differences between the number of questions regarding patient visits asked by urban and rural family physicians were observed by Ely et al. [36], who reported that urban physicians and those with the most colleagues in their practice tended to ask more questions, while the busier physicians asked the fewest. But differences between physicians have not always been found. Virginia Bowden et al. [39] found no significant difference with respect to the primary information resources regularly used (personal/office collections of books and journals, and colleagues) between physicians who practiced nearby a large medical library and those who did not. However, physicians practicing near the library did report making greater use of its services.

Numerous studies have documented physicians' need for immediate access to information and the importance of colleagues. As Cheryl Dee and Ron Blazek [40], supported by Diana Northup et al. [41], explain, colleagues are "familiar, reliable, immediately available, and inexpensive; they give concise, organized answers that synthesize available information" [40, p. 263]. But colleagues' inherent value goes deeper than being easily accessible and dispensing accurate information, because, as Shawn Curley et al. write, it "allows the physician to socialize, to leave routine, to display personal knowledge, and to generate professional contacts" [42, p. 238]. Physicians' tendency "to respond to information problems along known pathways, which are probably established fairly early in a medical career" [41, p. 880], partially accounts for the overwhelming use of colleagues as an information source.

Another important finding from the Dee study was that "physicians have many unanswered questions and that the information sources cur-

rently used are not sufficient" [40, p. 263]. In fact, David Covell et al. [43] reported that only 30 percent of information needs are met during the patient visit, which concurs with Andrew Murray's [44] finding that one out of every four questions arising from a patient visit is left unanswered. Interestingly, the Covell study also revealed through follow-up interviews that the number of questions posed by physicians was far greater than the number actually reported in a questionnaire, which implies that an even larger number of questions may go unanswered.

An analysis by Jerome Osheroff et al. [45] of the questions posed by physicians and medical students when attending rounds showed that an average of five clinical questions were raised for each patient visited. Of these questions, 52 percent required factual information that could be answered from a medical record, and 23 percent could be answered using a library, textbook, journal article, or MEDLINE. Twenty-six percent required synthesis of patient information and medical knowledge.

Barriers that impair physicians' use of print and electronic sources may partially account for why so many questions go unanswered. The Covell study [43] cited lack of time as the biggest barrier to using print sources along with the age of the textbooks found in the offices, poor organization of journal articles, and inadequate indexing of books and drug information sources. Thus, time, quality, and accessibility are the key attributes determining a source's usefulness, as also found by Donald Connelly et al. [46], who further reported that physicians used the *Physicians' Desk Reference* on a daily basis, consulted with colleagues at least weekly, but rarely used electronic information-retrieval systems. Here, resource cost variables (clinical availability and applicability of the information) were more influential than quality-related factors. The medical research literature was rated lowest in terms of credibility, availability, searchability, understandability, and applicability and was therefore used infrequently. As a result, these barriers, together with large-scale information overload, have impaired physicians' ability to keep up with new developments in the field [47, 48]. As we leave physicians, perhaps the most succinct way of summing the literature is to borrow from Diana Forsythe et al. [49], who concluded that physicians express needs in diverse, complex ways that require many different types of information, including informal and local.

Dentists

As with physicians and nurses, dentists must receive a degree from an accredited school and be licensed to practice in their area. The field of dentistry is "concerned with the teeth and associated structures of the oral cavity, including prevention, diagnosis, and treatment of disease and restoration of defective or missing teeth" [24, p. 399]. Operative,

preventive, and prosthetic dentistry are just three areas of specialization within this field. Dentists tend to practice alone or in small groups [50], which suggests a definite need for administrative and business-oriented information. Their involvement with continuing education, teaching, and research create other information needs along with those connected with patient care.

Like nurses, the information-seeking behavior of dentists is just starting to undergo systematic research. A few major studies to date were undertaken by Elizabeth Strother et al. [51], Bruce Murray [52], A. J. Duxbury and F. N. Leach [53], and Peggy Mullaly-Quijas et al. [54]. From these it is apparent that dentists share commonalities with other professionals with regard to needing and using information. Strother et al. [51] found that dentists primarily seek information for patient care, keeping up with new techniques, practice management, and research and specifically need information on new techniques, followed by information on products and equipment, medical complications, health hazards, drug treatment, and government regulations.

Dentists seldom appear to use libraries for gathering information [51], which partially may be because dental school libraries do not aggressively promote their services to practitioners, despite most dentists in the United States having access to these libraries [55]. So where do dentists seek information? Murray [52] found that dentists used the *Physician's Desk Reference* as their major source for learning about new drugs, followed by recommendations from colleagues and dental reference books. While convenience is the most important factor when choosing a source, reliability, comprehensiveness, timeliness, and cost are also considered. Strother et al. [51] found colleagues and personal journals were usually the top sources, but continuing education courses, association meetings, and personal book collections were also common.

Collectively, the research on the information-seeking behavior of health care professionals has generated a sizable literature from which we can draw out some general findings. What are the commonalities among health care professionals? How are their needs for information related? Based on our review, their information needs stem from tasks associated with several distinct work roles: patient care, current awareness and continuing education, practice management, administration, teaching, and research (though information regarding patient care is cited as primary by most professionals). The number of roles played by a professional will depend on his or her type of work and its setting. For example, only professionals engaged in private practice (or planning on starting one) will be concerned with practice management. However, all of them seek information from informal and formal sources, both from inside and outside their organizations, and their

choices are largely determined by ease of access, past success, time constraints, and the format and quality of the information.

Profile: Lawyers and Legal Research

The last group of professionals whose information-seeking patterns are reviewed is lawyers. What do lawyers do in the practice of law? There are many treatises that address this question at length, including works by Jerold Auerbach [56], Jack Batten [57], Jerome Carlin [58], and recently, Mary Ann Glendon [59]. However, with few exceptions, such sociopolitical discussions of the practice of law and the work of lawyers tend to concentrate on professional issues (such as ethics and accountability) or on the conduct of cases in particular types of law. The need for, and use of, information in the course of a lawyer's professional practice is mentioned only in passing, if at all. Yet the small number of studies that do exist that address the information-related needs of lawyers demonstrate that access to a wide variety of information is crucial to their work.

All lawyers must deal with an expanding and often overwhelming information universe, including not only well-established primary and secondary legal sources [60], but also a wide variety of other sources and databases covering, for example, environmental regulations, consumer health and safety, and scientific and technical data [61]. Within the universe of potentially relevant information, what is required by a particular lawyer will vary because lawyers (and law firms) often specialize in a few areas of the law, in an attempt to focus their practice. This has an immediate impact on information need and use, as it is commonly recognized that certain areas of law (such as real property) do not require the same amount of research or supporting documents as other areas that are much more labor intensive and expensive (such as taxation, litigation). Thus to a greater or lesser extent, lawyers must retrieve, amass, evaluate, and use this array of information to serve their clients. In the worldview of lawyers, the ongoing activities related to information retrieval and use are commonly referred to as "legal research."

The lawyer's need to conduct legal research is not just a haphazard occurrence. According to a well-established literature on legal practice, lawyers engage in certain major roles that result in distinct types of activities. These activities in turn shape the type of information needed, the way in which it is retrieved, and the ultimate use of that information. What are some of these roles? In an earlier study, Martin Mayer [62] stated that lawyers enact four principal roles or skills: drafting, advocacy, negotiating, and counseling. While the study is now rather dated,

there is considerable evidence that these four roles are still valid for lawyers today.

In the advocacy role, for instance, the lawyer seeks to "persuade someone (usually a tribunal of some kind) what the law should be, what law should be applied, or how the law should be applied" [63, p. 184]. This endeavor encompasses a number of tasks, such as determining relevant cases and precedents, necessitating a search of the primary and secondary legal literature. On the other hand, the drafting role (preparation of documents and correspondence) gives rise to other tasks, such as determining whether the firm has ever prepared documentation on the issue previously, or what prior research has been done on the topic, entailing a search of the firm's internal files of legal memoranda, opinion letters, and briefs [64, 65]. Some studies have suggested that lawyers may spend as much as a third of their time on tasks related to the drafting role [66, p. 4].

The counseling role prompts yet another cluster of tasks, including interviewing clients, responding to telephone queries, and representing clients in court. For example, it has been estimated that the average lawyer may receive and make between thirty and fifty telephone calls per day [66, p. 3]. For these calls to be productive, the lawyer must have quick access to the relevant files and information. Finally, beyond the four roles identified by Mayer [62], the Operation Compulex study [66] suggested a fifth major role for lawyers—the administrative or managerial role. This role can be broken down into tasks such as monitoring the firm's financial situation, training students, or delegating work to secretarial staff. These various managerial tasks result in the creation and utilization of information about budgeting, personnel, organizational procedures, the physical premises, and so on, forming yet another component of the lawyer's information universe.

While it is clear that lawyers' information needs and information-seeking behavior are highly related to these major roles and associated tasks, it is also evident from the research conducted to date that there are numerous variables that intervene in the information-seeking process. One variable that is frequently mentioned is the individual lawyer's attitude toward legal research, but there has been conflicting evidence about the impact of attitudinal factors. While some studies have suggested that many lawyers dislike legal research and prefer to farm it out to students and junior lawyers, others have noted that lawyers are often unwilling to delegate information-retrieval activities, since often they do not know exactly what piece of information may be crucial.

There are also other personal and situational factors that have a bearing on lawyers' information-seeking behavior. One such variable is the organizational context in which the lawyer practices. Lawyers in large,

specialized firms may have the in-house resources to delegate all or part of their legal research, while those in small firms may have no choice but to conduct their research themselves. A further influence is experience—lawyers with greater experience may be able to draw on their own professional knowledge to a greater extent or may be able to refer the case to a colleague, thus eliminating the need for certain kinds of legal research. Education is also a factor: many law schools are concerned that lawyers are not receiving adequate training in legal sources and information-retrieval strategies. In the belief that more emphasis on legal research will enable lawyers to search more efficiently and effectively, there have been repeated calls to integrate advanced legal research courses into the curriculum [67, 68].

Finally, a further variable that has an enormous impact on lawyers' information-seeking behavior and that has been discussed extensively in the literature is the lack of comprehensive and user-friendly finding aids and retrieval systems for legal materials. The Operation Complex study found major deficiencies in Canada's legal information system, including inconsistent or inadequate indexing of key sources, piecemeal law reporting by competing publishers, and a preponderance of Ontario case law [66]. In her review of what has transpired since that landmark study, Lillian MacPherson noted that while numerous improvements have been made, "many of the thorny problems related to the publication of and access to case law are still unresolved" [60, p. 504] and uniform access to the Canadian provincial and federal statutes has not yet been realized. Similar problems with coverage and access have also been noted in the United States. In addition to these long-standing problems, there is now the added dimension of having to choose the most appropriate database from a plethora of online and CD-ROM services, all with different coverage, but with potentially relevant information [69, 70].

While this overview of the literature has been kept deliberately brief, it is nevertheless evident that the information seeking of lawyers is highly dependent on their professional roles and is greatly influenced by a complex interaction of personal and contextual variables, including personal attitudes, educational background, experience, type of practice, area of specialization, and legal information systems.

Earlier Models of Professionals' Information Seeking

A number of conceptual frameworks attempting to capture distinct elements of the information-seeking patterns of professionals have been proposed over the years. These models have invariably focused on a

specific professional group or subgroup or on a specific aspect of the information-seeking process.

Research done on the work-related use of information by engineers has resulted in various attempts to model their information seeking. One of the earliest contributions was made by Richard Orr [71], who advocated a time-allocation model of communication behavior. In this model, the engineer acts as an information processor, dealing with communication inputs and outputs. Information inputs could arise from either experimentation and observation or through access to a varied pool of existing information sources, such as colleagues and records. The decision rules governing the selection of one alternative over another were considered to be exceedingly complex and were influenced by a number of factors. Orr hypothesized that options were weighted by the individual, based on the perceived likelihood of success in acquiring relevant information within an acceptable time line and cost associated with the various options.

William Paisley [72] used a systems approach to propose a model where the scientist/technologist is at the center of a number of environments or systems, each of which relates to one of the many aspects of his or her work. Paisley described ten informal and formal systems and subsystems, capturing various dimensions of communication, from the local (or personal) to the organizational (or term), economic/legal, and cultural dimensions.

Using their extensive body of research, Brian Vickery and Alina Vickery [73] proposed several models of the different aspects of information retrieval and use by engineers. In one model, the engineer's personal knowledge and files are envisioned as the core of a complex information world that radiates out in successive petals, with each petal representing a distinct store of external information, such as colleagues, technical literature, government departments, and others. Another more specific model attempts to show how an engineer's work-related reading affects their productivity and the type of activities they undertake (for example, more reading leads to more writing, leads to greater conference participation, and so on).

More recently, Thomas Pinelli et al. [74], building on previous models and on extensive empirical studies of the aerospace industry, put forth a comprehensive model of information seeking of the engineer-scientist. In this conceptual framework, an information need arises from a project, task, or problem and can be either internally (Orr's inputs) or externally (outputs) oriented. Both inputs and outputs require the use of specific types of information sources. Subjective criteria of cost, time, and likelihood of success govern the choice of alternatives. A range of sociometric and institutional variables are then proposed as critical

factors influencing the selection of information source (or channel), whether it is the informal, collegial network or the formal information system. Three outcomes are suggested for the selection process: (1) success, that is, information was found and useful, (2) reevaluation, due to incomplete information, or (3) failure, information found is irrelevant.

The factors affecting physicians' use of medical knowledge resources were behind the cost-benefit model created by Shawn Curley et al. [42]. Using the results from questionnaires sent to 228 internal medicine and community family practice physicians, they learned through a multiple regression analysis of the data that physicians' source preferences could be mapped according to their level of training, the resource medium, and the availability and applicability of the information. Though Curley et al. [42] found that benefit-related qualities such as extensiveness and credibility were insignificant, the cost variables (availability, searchability, understandability, and clinical applicability) were statistically significant. While this model is useful for understanding the source preference decision making of professionals, it does not account for how and why physicians' information needs arise, nor how the information is later used (that is, how it satisfies the original need).

Researchers have also been particularly interested in physicians' problem solving and diagnostic processes. Larry Gruppen [32], building on the work of Howard Barrows and Kara Bennett [75], Jermone Kassirer and Anthony Gorry [76], and Arthur Elstein et al. [77], describes the "clinical reasoning process," a conceptual model of why physicians seek information in practical settings. When diagnosing a patient, physicians often go through a repetitive "hypothesis generation/revision—evaluation—information-gathering cycle," where they form a hypothesis of the patient's condition at the outset and then rely on their internal knowledge and empirical information to determine whether to accept their initial hypothesis. During this process physicians may seek external supplementary information to assist with final diagnosis. As opposed to making actual diagnoses, the information sources consulted in Gruppen's model usually "centre around interpreting or evaluating findings, identifying a better diagnostic test for evaluating hypotheses, or identifying alternative responses relevant to a specific diagnosis" [32, p. 167].

Along similar lines, physicians' clinical questions have been examined by Valerie Florance and William Welch [78]. A structural analysis of physicians' online search requests was performed to study the nature of clinically applicable medical knowledge. Coding for stated and unstated needs, certainty levels, implicit and explicit assumptions, decision-making processes, and the type of answer required, four states of information valuable in patient care were identified: prediagnostic assessment, diagnosis, treatment choice, and learning. Florance and Welch

present these states in frame-like structures that combine declarative (factual information) and procedural (strategies and principles for evaluation and choice) components of medical decision making. They concluded that clinical problem solving requires a blend of the two, and that their ratio depends, in part, upon the reasoning under way at the time of the request.

Unlike the situation for engineers and physicians, models of the information-seeking behavior of lawyers are relatively harder to find. The Canadian Department of Justice study [66] provided a simplistic model that divided the lawyer's time into various activities, such as interviewing clients, conducting research, and drafting documents, but the information-seeking implications of these activities were not made explicit in the model. Most of the literature about lawyers' information seeking concentrates solely on legal research and problem solving, depicting an orderly flow-chart or step-wise approach to the gathering of legal information. For instance, two of the most respected texts on legal research, Margaret Banks ([79], Canadian) and Morris Cohen, Robert Berring, and Kent Olson ([80], American), depict legal research as a carefully constructed process of familiarization with standard legal reference tools, which are usually consulted in a specific order. Along these lines, Jacqueline Castel and Omeela Latchman [81] have developed a legal research checklist to assist lawyers in their information seeking. While these types of linear models are helpful in understanding the complexities of legal research and give us a glimpse into the difficulties faced by lawyers in gathering information, they are nevertheless only a partial view of the wide range of information-seeking activities undertaken by most lawyers in the course of their daily practice.

Modeling the Information-Seeking Processes of Professionals

As is apparent from the preceding review of the literature and from the small sample of models discussed in the previous section, attempts to model the information-seeking activities of various types of professionals are as diverse as the professions they represent. Some models consider the individual as the starting point, others look at the organizational context, and yet others present information seeking only as it relates to one or two key work activities. Yet despite the incredible diversity in conceptual frameworks and graphic representations, certain common assumptions or themes are evident in these models. What are these significant themes, and how might they be presented in a generalized model of the information seeking of professionals?

First, while it is true that the provision of various types of service or expertise to their clients is the overarching activity that links all profes-

sionals, they work within specific environments that differ greatly in organizational structure, mission, goals, and social culture. Thus, in order to investigate the information-seeking behaviors of professionals, the broader working context in which professional practice is conducted must be closely examined and understood.

Second, many of the studies of various groups of professionals have arrived at the same conclusion: in order to begin to understand a professional's information-seeking processes, the details of that individual's work must be examined in depth. The need for certain kinds of information, the process of retrieving it, and the uses to which it is put arise out of the ways in which professional practice is carried out on a daily basis.

Third, related to the previous point, even a cursory examination of the detailed elements of professional work reveals that professionals have complex responsibilities and are expected to perform successfully in a number of dimensions (for example, technically, managerially, interpersonally). These dimensions, or roles, are often distinct and are further complicated by associated tasks that must be carried out (for example, the managerial role prompts a scheduling task or an accounting task). Together, these roles and tasks generate information needs that must be met in order to move the work forward. Various roles and tasks, therefore, are often visible components of models of the information seeking of professionals.

Finally, studies of diverse professional groups have all concluded that frequently, professionals are frustrated in their search for relevant and necessary information. Frustration results because a large number of complex and interacting variables may influence information-seeking processes. As the information need arises, factors such as the corporate culture, individual habits, availability of information systems and sources, commitment to professional development, and so on converge to affect the outcome. Although there are certain variables that generally have been found to be critical (such as accessibility and ease with which retrieval can be accomplished), the ways in which these variables will converge is somewhat different from individual to individual, lending a certain air of unpredictability to the information-seeking behavior. Thus successful modeling of information seeking must incorporate enough flexibility into the model to allow for the complexity and unpredictability of information-seeking processes.

A Proposed Model of the Information Seeking of Professionals

Drawing on the themes evident in the literature, and bearing in mind the limitations of earlier models, an original model of the information

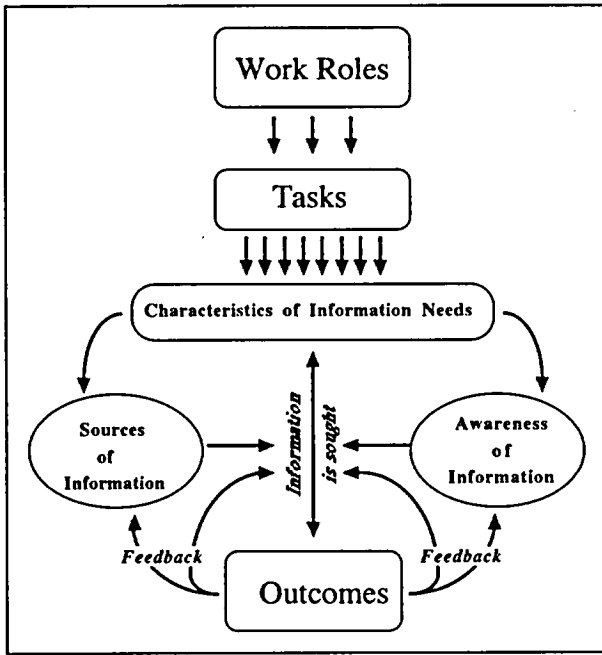


FIG. 1.—A model of the information seeking of professionals

seeking of professionals was developed (fig. 1). Since the model has arisen out of a careful consideration of the research literature on different groups of professionals, it is intended to be generalizable across the professions.

The basic supposition of the model is that the roles and related tasks undertaken by professionals in the course of daily practice prompt particular information needs, which in turn give rise to an information-seeking process. However, information seeking is greatly influenced by a number of interacting variables, which can ultimately affect the outcome. Furthermore, any of the components of the model can occur simultaneously, thus representing the true complexity of a professional's work life. The specific features of the model are described as follows. In the discussion, it should be noted that the variables and characteristics mentioned are not intended to be comprehensive but, rather, are examples that might be considered under the various components of the model.

Work Roles and Associated Tasks

Existing empirical studies on the information needs and uses of professionals demonstrate that professionals lead complicated work lives and

must assume a multiplicity of roles in the course of their daily work [27, 64, 82]. Five professional roles that are frequently mentioned (loosely in order of frequency of occurrence) are service provider, administrator/manager, researcher, educator, and student.

Embedded within these roles are specific tasks (such as assessment, counseling, supervising, report writing), constituting the second layer of the role/task component in the model. Furthermore, the research also shows that information seeking is highly related to the enactment of a particular role and its associated tasks. In order to illustrate some of their characteristics, in the following discussion, each role is paired with associated tasks.

Perhaps the most prominent role, common to all professionals, is that of service provider, which focuses on the creation and delivery of a vast range of services (including both expertise and physical products) to the client. In their role as service providers, professionals may carry out a variety of tasks, such as assessing client needs or solving technical problems. For instance, the primary role of the engineer is to provide a product for a client or group of clients. However, in doing so, engineers must carry out various technical and nontechnical tasks, such as designing the subcomponents of a system or conducting financial or mathematical analyses, for which a great deal of specific information is required [9]. Similarly, in their primary role as the client's legal representative, lawyers are often faced with the task of preparing for an upcoming trial and may need to access publicly available information on past cases, as well as the firm's internal records about how similar cases were handled [63]. Studies of health care professionals such as dentists, nurses, and physicians have shown that they spend the majority of their time in the role of direct service provider and that the tasks associated with patient care create their greatest need for information. Dentists, for example, often require information on new techniques in dentistry, products, and equipment [51] and on new drugs [52] in providing patient care. For physicians, tasks associated with patient care create needs for information on differential diagnosis, treatment recommendations, drug information, and diagnostic criteria [38].

Another important role for numerous professionals is that of administration and management. Whether in a private practice or an institutional setting, professionals may have distinct information needs due to tasks stemming from an administrative role. For instance, the tasks performed by nurse administrators require information on staffing, workload, and budgeting [83, 84], while the administrative tasks performed by clinical nurses create needs for institution-specific information such as tracking equipment, medications, reports, and people, as well as information on admissions, transfers, and discharges [27]. Fur-

ther, engineers often complain that they are overwhelmed by the amount of paperwork demanded by their work and that such a burden seriously inhibits the quality of their work and their productivity [21].

The professional's role as researcher is one that makes distinguishing him or her from the scholar confusing. Though a practitioner, he or she may do research and disseminate the results in both the scholarly and professional literatures. Research may be conducted in partnership with an academic institution or it may arise solely from within the professional's organization and grow from his or her work. In some cases, this type of activity may represent the main work role, as is the case for a majority of engineers active in research and development organizations [13]. The need for research-related information is also documented in the literature for dentists [51], as well as for allied health workers, nurses, and physicians [85]. Tasks associated with the role of researcher involve writing publications and speaking at conferences.

The fourth role, educator, contains two subroles. First, a professional may be involved with community outreach providing public awareness, such as a public health nurse giving presentations on hygiene. Second, the professional may teach courses to students at a college or university. For example, 16 percent of the 344 dentists surveyed by Elizabeth Strother, Diana Lancaster, and James Gardiner [51] reported they were on faculty with either full-time, part-time, or volunteer status at a dental school. Tasks associated with the educator role would include planning and curriculum development.

While professionals can be teachers, they can also be students, our fifth role. Several studies indicate that an ongoing aspect of a professional's work is keeping up with the advancements in one's field and upgrading one's education and skills by taking courses. Research on the information needs of nurses [25, 28, 29], physicians [32], and dentists [51] reveals that they all spend time on professional development and continuing education and that they express needs for information pertaining to this role. Within the student role, specific tasks would be professional reading, or attending conferences and meetings.

Characteristics of Information Needs

Generally, information needs arise out of situations pertaining to a specific task that is associated with one or more of the work roles played by the professional. However, an "information need" is not constant and can be influenced by a number of intervening factors. Drawing from the current literature, variables that influence or shape the information needs of professionals include (in random order) individual demographics (age, profession, specialization, career stage, geographic location), context (situation specific need, internally or externally

prompted), frequency (recurring need or new), predictability (anticipated need or unexpected), importance (degrees of urgency), and complexity (easily resolved or difficult).

Studies on the information seeking of professionals indicate that the nature of the specific profession, and factors such as age, career stage, area of specialization, and geographic location, can influence the formulation of the information need. In an important study of earth science engineers, Gralewska-Vickery [8] found that the range of information that engineers required in their work varied with career stage, with junior engineers having a narrower range than those in more senior positions. Furthermore, with respect to geographic location, studies of the information-seeking behaviors of lawyers have noted that the legal jurisdiction in which they practice has a considerable impact upon their information requirements [66, 86].

While information needs may be influenced by factors relating to the individual as above, there are also other more general characteristics of information needs that enter into the equation. Two examples of these general factors are frequency and complexity. With respect to frequency, David Bresnick [64] has noted that lawyers have recurring information needs relating to previous cases handled by their own firm, which can result in wasted time searching for internal documents if the firm does not have a good records management system in place. Regarding complexity, Osheroff et al. [45] conducted an analysis of the questions posed by physicians and showed that their information needs varied considerably in complexity, ranging from direct questions that could be answered using a patient's record to a complex question that required a synthesis of patient data, hospital records, and medical knowledge.

Finally, it should be pointed out that each factor in the information need component of the model exists on a continuum of intensity and interacts with the others in a complex fashion. For instance, an information need could be unforeseen but relatively unimportant and its solution not needed immediately, while on the other hand, an unexpected need could be of great importance and extreme urgency. The level of complexity, the degree of importance and urgency, and whether the information need is anticipated or unexpected together will affect the information-seeking activity undertaken. However, the way in which information is sought is also influenced by other important factors, as follows.

Factors Affecting Information Seeking

Sources of information.—Professionals seek information from an endless number of sources, such as colleagues, librarians, handbooks, journal

articles, and their own personal knowledge and experience. These sources of information can be broadly characterized by types of channels or formats, including formal (for example, a conference, a journal) or informal (for example, conversation); internal or external (source within organization or outside); oral or written (that is, written including paper copy and electronic text); and personal (own knowledge and experience, professional practices).

The first three sources of information are readily identified in the literature. For example, a study of the information needs of rural health care workers by Gerald Lundeen et al. [85] found that journal articles and informal discussions with colleagues were the sources most frequently consulted by physicians, nurses, and allied health professionals, whereas health care administrators preferred journal articles and reports. Similarly, research on engineers has shown that they have a strong preference for informal sources of information, such as colleagues, and their own personal collection of technical reports, handbooks, and journal articles [13].

Personal knowledge and experience have been isolated here as a separate characteristic because often they are not adequately recognized as a primary source of information. One of the aspects that makes a "professional" different from other kinds of workers is the advanced body of specialized knowledge that an individual must master to practice a particular profession. Therefore, it is not surprising that studies have shown that professionals tend to rely on their own personal knowledge and experience first when faced with a work-related decision or problem [12, 63, 82, 87].

Personal knowledge and experience also encompass the different ways that work is conducted or practiced within various professions. Such differences affect which sources professionals will use and may contribute to habitual patterns of information seeking that are common to certain groups. Nurses and engineers, for instance, rely heavily on ready reference materials, such as handbooks. Nurses, in particular, require this material to be conveniently located at the nursing station to be of optimal use [25]. Lawyers, on the other hand, may be more satisfied with a centralized collection of a broad range of legal materials in the firm's library.

It should be noted that the choice of an information source is not necessarily dichotomous—a combination of several sources (either simultaneously or in sequence) may be required to fill an information need. This continual interaction contributes to the overall complexity of the source as a variable affecting information seeking.

Awareness of information.—Direct or indirect knowledge of various information sources (whether a colleague, an online database, or a handbook)

and the perceptions formed about the process, or about the information retrieved, play a crucial role in the overall information-seeking process. Thus the individual's general awareness about information sources and/or content can determine the path that information seeking will take. Based on a review of the literature, some of the most important variables in this regard were found to be (in random order) familiarity and prior success (results obtained from strategy or source), trustworthiness (how reliable or helpful), packaging (convenience, usefulness, and others), timeliness (found when needed), cost (relative cost-effectiveness), quality (level of detail, accuracy, and so on), and accessibility (relative ease of access).

Research has shown that professionals are likely to consult a source for information if they are familiar with it and have had prior success using that source for an earlier problem or similar need. For example, confronted with too much unevaluated information, engineers will often select a source based on authors they already know and have used [8] and lawyers will tend to use their notes from other cases, as well as familiar digests, citators, and other ready reference sources [63, 86].

Trustworthiness is a very important influence that actually describes a number of perceptions. Trustworthiness can refer to the professional's faith that a source will provide accurate information—a reflection of the source's perceived capability. It can also represent the belief that the source is not socially risky (for example, that the nature of the request will not be revealed and that confidentiality will be kept). To illustrate this last item, imagine a junior engineer or nurse who needs some piece of information but does not want to reveal to their supervisor that they have such a need. It is very likely that the professional will then turn to a colleague or other source whom they trust to ask for the required information.

Packaging can also be a prevalent influence, especially when a professional needs information through a particular medium or in a specific format. For instance, Maryann Gierloff et al. [83] found that nurse administrators wanted key pieces of information, such as infection-control statistics, available online. However, other studies have shown that the choice of packaging varies according to purpose; for example, when pursuing their own continuing education, physicians much preferred a journal format [88].

Timeliness is the fourth influence that professionals consider when seeking information. Whether a need is planned or unforeseen, it is often important that the information be obtained immediately or within an acceptable amount of time. Its usefulness and impact will decrease if it is either obtained too early or too late [89]. In other words, the information must coincide with the need, as it happens in the natural progression of the professional's work.

The cost involved with accessing a particular source will also affect whether a professional decides to use it. The importance of the need, time factor, and monies available will determine how much effort and expense a professional will spend seeking information from any given source. Cost can also be psychological (that is, having to learn to use a new source of information or ask a superior at the risk of being judged incompetent) and physical (that is, effort to locate and acquire a specific piece of information). For example, a statistically significant relationship between physicians' use of an information source and several access cost variables was found through the empirical testing of a cost/benefit model proposed by Curley, Connelly, and Rich [42].

While quality may be sacrificed for efficiency in some cases when a professional is seeking information, it is nonetheless always a consideration. Orr [71] suggested that it is the perceived quality and relevance of information that ought to be the primary criteria with which engineers select an information product or service. Although some evidence seems to support this assertion—for example, in their study of factors affecting the use of technical reports by aerospace engineers, Pinelli et al. [74] found that technical quality was one of the strongest determinants of usage—little empirical data exists to substantiate it. Accordingly, Strother, Lancaster, and Gardiner [51] discovered that for dentists quality may be less important when considered along with cost and accessibility.

Perhaps the most dominant factor, however, is accessibility. The view of the relative accessibility of information can be influenced by physical proximity and by other considerations, such as the language used to convey the information. Numerous studies have shown that various types of professionals perceive their own collections to be the most accessible and will use those collections even if the information is rather limited. Studies of physicians [38, 39] have shown that they prefer to seek information from their personal or office collections of known books and journals before going elsewhere. Similar conclusions have been drawn from numerous studies of engineers [8, 12, 13, 22] and other professional groups [90]. However, current perceptions of physical accessibility may be changing due to the proliferation of electronic sources. Joanne Marshall [30], for instance, has noted the slow but steady increase in usage of medical databases by practicing health care professionals.

Finally, as is true of the other components of the model, the factors noted in this section are not static but continually interact. In their information-seeking strategies, professionals use their own awareness of information sources and content to make assessments about the relative importance of various factors, such as timeliness versus cost, conve-

nience versus quality, and so on. There is also the possibility that through the process of information seeking, awareness itself may change, thus further complicating information seeking. This possibility (that a professional's awareness of information may change) is handled in a feedback loop in the final component of the model, as noted in the following section.

Outcomes

Outcomes are the results of the information-seeking process. An outcome may be the end point of the work-related requirements of specific roles and tasks. In this case, the optimal outcome is that the information need is met and the professional accomplishes the task at hand, such as diagnosing an ailment or completing a technical report. Some of the common outcomes of information seeking identified in the literature include providing a service or product, completing paperwork, realizing operational benefits, and achieving professional development goals.

It is possible, however, that the outcome of the information seeking is that the need is not satisfied and further information seeking is required. This is conceptualized as a "feedback" loop on the model. As a second round of information seeking is undertaken, the configuration of factors that come into play may alter. Whereas previously the individual may have sought information informally, because this was perceived to be timely, through feedback it was discovered that the information gathered, was, in fact, not very accurate. Therefore, in the next round of information seeking, it is likely that a completely different mix of source and awareness factors will be involved.

The feedback loop also illustrates that an information-seeking outcome is not a one-dimensional event. It is possible that an outcome from one task associated with a particular role (such as advising clients in the counseling role) may quite unexpectedly benefit the professional in another role (such as planning for new services in the managerial role). Information-seeking activities and related outcomes, therefore, may have a much broader impact on professional practice than has been recognized.

Conclusion and Suggestions for Future Research

The model is intended to capture the complexity of the information-seeking activities of professionals, as reflected by findings discussed extensively in the literature. The model stresses that the conceptualization of why and how a professional seeks information cannot be reduced

to a simplistic analysis of sources alone but, rather, involves a greater understanding of the various roles a professional performs and the associated tasks that prompt a need for information. While the need for information is conceptualized as heavily influenced by the role-task relationship, there are also general factors (such as career stage or whether the need is recurring) that characterize the professional's information need. The resulting information-seeking activity is thus viewed as being contingent upon two major interacting factors: sources and awareness. These two factors in turn are composed of a constellation of distinct variables that may or may not come into play, creating the dynamic nature of information-seeking activity and outcomes.

A general model of this sort is useful for several reasons. First, since the major components of the model have arisen directly from extensive analysis and discussion of the research literature, the model integrates the findings of existing research, which, as noted previously, tend to be scattered and incoherent. It also provides an alternative to models of scholarly communication, which may be reflective of the information-seeking behaviors of scholars and scientists but are highly problematic when applied to other groups. Since research into the information required and used by nonacademic professionals is growing rapidly, this general model could be extremely useful in guiding new and emerging areas of research and also as a basis for the reexamination of the information-seeking behavior of professional groups that have already been studied.

Second, the model could serve as a theoretical framework for developing future empirical research on the information seeking of diverse groups of professionals, some of whom have yet to be studied in detail (such as the clergy, accountants, administrators, and others). Each element of the model, as introduced here, is sufficiently elaborated to provide guidance in the choice of variables for which empirical data can be collected and analyzed. Along these lines, a pilot study is being developed by us to apply the model to community health nurses.

Third, the model has the potential to broaden our theoretical horizons. It emphasizes a role-theoretical perspective, which is implicit in much of the research literature reviewed but is rarely acknowledged directly. Although there is insufficient space in this article to provide a comprehensive review of role theory, the incorporation of aspects of this perspective into the theories of information seeking articulated in library and information science would greatly enhance our understanding of the information-seeking activities of professionals and could provide very fruitful ground for future work. Ultimately, it is hoped that the model will prompt new insights and will give rise to more refined

and more applicable theories of information seeking, thus emphasizing the importance of this particular field of study.

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