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Trends in analyzing access to information. Part I: cross-disciplinary conceptualizations of access

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Abstract

Part I of two articles reviews six research literatures that consider access from different vantage points to identify common aspects of the concept 'access to information'. The resulting multi-dimensional framework includes (1) conceptualizations of information itself (resource/commodity, data in the environment, representation of knowledge and part of the communication process), (2) conceptualizations of the notion of access (knowledge, technology, communication, control, goods/commodities and rights), (3) a set of general information seeking facets (context, situation, strategies and outcomes) and (4) a variety of influences and constraints (physical, cognitive, affective, economic, social and political). Only a comprehensive consideration of these factors will allow us to understand the concept of access to information, as well as develop and study systems, institutions and policies that foster improved access.

1. Introduction

Access to information affects our lives from economic well-being to privacy rights, from workplace management and monitoring to policy and decision making and from daily errands to transnational business. With the growth of interactive media and Internet communication, old questions of access arise again and new questions emerge. With access underlying many different areas of everyday life and implicit in much research, we need to understand its dimensions in order to consider seriously its implications and to guide us in designing policies and systems.

Access can be understood from the perspective of both those with access and those without. Power in this context lies not only in conscious decisions to control access. It also lies in the

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power to set and follow the terms of the debate, to define the parameters for form and content and to establish the framework for the very notion of what information can mean (Hall, 1982). In many cases, gaining access to information requires first gaining access to relevant interpretations held by a society, group or organization (Geertz, 1973). In a library setting, for example, insiders such as reference librarians or frequent system users understand the 'rules of the game' (Taylor, 1968) and have realistic expectations about what needs they might address through information, perhaps using the World Wide Web, card catalogue or book. Outsiders may never become users because of barriers such as the required knowledge of a variety of formats and functions of computer technologies in order to retrieve the information. Given the potential economic, social, political and personal impacts of access to information or barriers to access, considering as broad a range of perspectives as possible may offer insight in understanding the concept of access to information itself. It may also be useful in designing and operating systems intended to provide access, to both users and 'non-users' or 'outsiders'.

An intensive review was conducted of six research literatures that consider access from different vantage points, library studies, information science, information society, mass media, organizational communication and economics of information. The separate reviews of each discipline are not included here. However, the following sections analyze and synthesize those research perspectives in order to identify common issues and concerns across the disciplines. Such an analysis has the potential to contribute to development of theories about communication and information, the choice of research and evaluation methods and design and use of communication media and information systems.

2. Common concepts across research areas

Based on the literature reviews, the following sections address four questions: (1) what are underlying conceptualizations of information?, (2) what are common issues and concerns about access?, (3) what are common facets of the information-seeking process? and (4) what are common influences and constraints on access to information?

2.1. Conceptualizations of information

Information is a concept that is applied in multiple ways in everyday usage as well as in the research literature (see Belkin & Robertson, 1976; Belkin, 1978; Fox, 1983; Machlup & Mansfield, 1983; Buckland, 1991; Hayes, 1993; Schement, 1993). Here, we identify and illustrate the range of what is meant by information, hoping to shed light on assumptions about information that have implications for notions of information access. Table 1 summarizes these conceptualizations and underlying assumptions.

2.1.1. Information as commodity/resource

Some disciplines emphasize information as a thing or resource (see Arrow, 1979; Bates, 1988; Buckland, 1991; Hirschleifer & Riley, 1992), a commodity that can be produced, purchased, replicated, distributed, manipulated, passed along, controlled, traded and sold. This conceptualization is consistent with a model of sending information as a message from sender to receiver. It may include an assumption that the receiver will interpret and understand the

Table 1
Conceptualizations of information

Conceptualization	Description	Assumptions
Resource/commodity	A message, a commodity, something that can be produced, purchased, replicated, distributed, sold, traded, manipulated, passed along, controlled	Assumes sender → receiver; assumes receiver makes of message what sender intends
Data in environment	Objects, artifacts, sounds, smells, events, visual and tactile phenomena, activities, phenomena of nature	Accounts for unintentional communication
Representation of knowledge	Documents, books, periodicals, some visual and auditory representations; abstractions of information (e.g. citations)	Assumes printed document is primary representation of knowledge; assumes primacy of scientific/technical knowledge
Part of process of communication	Part of human behavior in process of moving through time/space to make sense of world	Assumes meanings are in people, not in words; assumes human behavior is basis of understanding of the process

message as intended by the sender. It may also allow for value to be added as the information is disseminated or exchanged. Fundamental questions of access that arise from this conceptualization include motivations for creation and consumption of information, especially in contexts of innovation or problem-solving; individual preferences for and valuation of information; strategies for boundary-spanning, environmental scanning and gatekeeping (Auster & Choo, 1996) and market mechanisms for establishing the value of information especially with the rise of electronic commerce (Wigand, Picot, & Reichwald, 1997). Thus access to a supposed 'public good' by society at large may conflict with access to benefits from creating information by individuals or companies.

2.1.2. Information as data in the environment

Other disciplines tend to view information more broadly, to include data in the environment, available for interaction with human information processing capabilities. This category includes objects, artifacts, sounds, smells, visual and tactile phenomena, activities, events or the phenomena of nature. As Buckland (1990) points out, it is easy to assume that all communication is intentional. In practice, however, one is informed also by perceptions of things that are communicated unintentionally. That is, neither the individual nor the data intentionally engage in communication. The discoveries one makes in the process of casual (non-goal-directed) browsing (Chang & Rice, 1993) or the inferences another makes about an individual's character or performance based on observation of the individual's behavior when exposed to view (Archea, 1977), particularly when the individual is unaware of being observed, serve as additional examples of unintentional communication available when one attends to information as data in the environment. Related to this conceptualization of information is an economic treatment of information as an indication of value of some object or the objective

basis for subjective beliefs on which decisions are actually based (Hirschleifer & Riley, 1992, p. 168).

Taylor (1996) specifically uses the environmental approach in his concept of information use environments, which are intersections of (a) sets of people (professions, entrepreneurs, special interest groups, socioeconomic groups); (b) classes of problems (well- versus ill-structured, complex versus simple, assumptions agreed upon versus not agreed upon and familiar versus new); (c) work settings (involving attitudes towards information, task domain, information access and history/experience, constraints and opportunities) and (d) what constitutes problem resolution. These environments are contexts for various kinds of information needs, with constraints on, habitual patterns of and resources for, accessing information. Indeed, there is a wide variety of influences on, and forms of, managerial access to information, as described by the Katzer and Fletcher (1996) model of managers' information environments. Thus they, like Taylor, argue that information environments involve people working in settings, in various roles, doing various activities, experiencing different problem dimensions, applying context-based and dynamic cognitions. This requires, then, a shift from considering access as an act of answering questions and retrieving facts, to a process of resolving problematic situations and reducing equivocality.

2.1.3. Information as a representation of knowledge

Some researchers view information as a representation of, or pointer to, knowledge. The tradition of scientific method and scholarly publication is a clear example of this conceptualization (Lievrouw, 1988). Card catalogues or databases of citations to scientific documents illustrate an abstraction of a representation of knowledge, providing information about where or how to pursue a representation of information, such as in documents, books and periodicals. Traditionally, this view of information has been based on the assumption that the printed document is the primary representation of knowledge. Recent years have seen a proliferation of alternatives to print, such as representations of knowledge available on video- or audio-tape, videodisc, CD-ROM, Internet or other electronic and computer media.

2.1.4. Information as part of the communication process

Finally, some disciplines conceptualize information as part of the communication process, as part of human behavior in the process of moving through space/time to make sense of one's world (Atwood & Dervin, 1982). From this view, meanings are in people rather than in words or data (Berlo, 1960) and knowledge is what users do with data rather than what data do to users (Budd, 1987). Information gathering and processing are not physical or cognitive activities separate from work (that is, as preparation for accomplishing their real tasks), but inherent regular activities that constitute the very nature of what people in organizations do (Solomon, 1997a; Solomon, 1997b; Solomon, 1997c). These depend heavily on personal interactions inside and outside of the agency, action deadlines, emergence of other priorities, satisfaction, self-interest, privacy, diversity in information processing styles and separate and joint situational sense-making. Temporal and timing factors, social factors and personal factors all play a role in accessing information as part of work practices. An implication for access to technology is that information systems to support tasks in social settings should be integrated into the organizational and institutional designs, rather than conceptualized as some external repository of independent information. This view of information is included in some

typologies, such as that of Spender (1998) which categorizes types of organizational knowledge along an individual/social dimension and an explicit/implicit dimension. So, for example, collective knowledge is social and implicit, sort of a 'public good' that no one can control, but can be affected through mismanagement, free-riding and narrowly bounding.

An assumption of this conceptualization of information is that understanding must be based on observation of human behavior in the information seeking and sense making processes and on the meanings intended and interpreted by the participants.

2.2. Conceptualizations of access to information

This section presents six categories of how access to information is considered across the research areas, summarized in Table 2.

2.2.1. Access to knowledge

The most common understanding of access to information can be categorized as access to knowledge and its representations (Budd, 1987; Gandy, 1993).

O'Reilly (1978) discusses access to information in an organizational context. This usually assumes that a message can be sent and received as intended by the sender and that that message, or the knowledge derived from it, might influence decisions made within the organization. He argues that employees might intentionally manipulate information to serve the ends of the sender, particularly when directed from a subordinate to a superior within the organization. Sometimes such manipulation includes withholding information or keeping knowledge from the primary decision-maker. 'Psychopathic manipulation' can occur as a function of a social or technological system, imposed through rules and procedures, subsystem structures or membership selection methods (Singer, 1980). The result is that the individual is unable to correct errors, adding an additional barrier to gaining access.

The workplace provides a physical environment in which one can derive knowledge, sometimes about other people. An individual's behavior in the workplace can be observed, monitored or recorded by others (US Congress, 1987; Garson, 1988), sometimes without the individual's knowledge (Gandy, 1989), but also sometimes directly useful to, and controlled by, the user. The work environment and its arrangement also leaves the individual exposed to view by others and, at the same time, provides access to observe the environment and activities within it (Archea, 1977). Some are concerned that such knowledge could lead to the exclusion of certain individuals or classes of individuals from potential employment (Doctor, 1992; Gandy, 1993).

In the contexts of libraries and information science, the most familiar examples of access to knowledge include printed documents such as books and periodicals (Chen & Hernon, 1982; Schiller, 1989a), citations to documents (Blair & Maron, 1985; Bates, 1986; Borgman, 1989), databases of citations (Hart & Rice, 1991) and data (Borgman, 1989). These are representations of knowledge and, when put to use, potential building blocks for new knowledge. Access to evidence in support of facts (Buckland, 1990) can be gained either through observation and experience or through use of print and other representations of knowledge.

The pursuit of knowledge as part of the communication process carries implications for the well-being of the individual or a society, such as access to education (Hiltz, 1986) or access to

Table 2
Conceptualizations of access to information

Category	Examples	Implications
Knowledge	Message sent, information flow; Observation, visual sources, evidence; Documents, books, periodicals, numerical or digital data, databases, citations; Analysis, advice, interpretation, debate, answers, education	Can lead to decision-making, control over information flow; To quality of life, quality of work life; To power, influence; To socioeconomic opportunities: equity, funds, legal advantage, participation in democratic society and citizenship activities
Technology	Range of technologies and media: computer, telephone, movies, books, newspapers, magazines, music, tv, etc.; Information delivery systems, systems that generate, store, create information; Interface or command language, software, programming; Use of system; Linking technologies: interactive, communication, networking technologies	Assumes that access to technologies leads to access to information; assumes an infrastructure of support; Assumes knowledge of how to use; Can lead to access to multiple data sources, automatic methods of surveillance, increased control, creativity; Compounding effect: access to one technology can increase future access, experience, advantage
Communication	Making sense of things: content, comprehension, retention, explanation; Making use of information: accuracy, relevance, format, level, decision making; Connectivity; Communication competence	Assumes communication competence; Requires broader meaning of relevance; Can lead to social, political participation with implications for democracy, equity, power relations; Compounding effect: access likely to lead to greater competence, access
Control	Over who has access to what to whose advantage; Over the agenda, terms of debate, content, organization, design, program; Over processes and flows of information; Over production of culture	Assumes that power and control are associated with information and knowledge; Compounding effect: those who control access more likely to decide, design in favor of others most like them
Goods/ commodities	Information as social, economic good with value, costs, benefits; Distribution of control capacities, availability of resources; New markets for information industry	Assumes potential for public good, social value; Value not known until used; Compounding effect: potential for economic barriers and paths to be reinforced by social dynamics
Participation	Services: governmental, communication, information; Advocacy; Privacy	Can influence right to participate as citizen; Compounding effect: those most in need often least likely to obtain services

answers to questions (Paris, 1988; Pfaffenberger, 1990; Doctor, 1992). Access to advice on or analysis of political or economic issues may influence the degree to which an individual can participate as a citizen (Murdock & Golding, 1989). Access to knowledge can also be understood as access to creating or distributing information, such as through the mass media (Bagdikian, 1990), through interactive media or bulletin boards or through publication in the scholarly or popular press.

2.2.2. Access to technology

For some, access to information necessarily implies or requires access to technology or may not extend beyond the point of interaction with the technological system. For others, technology is, at the very least, an issue of major concern in gaining access to information (Culnan, 1985; Bourque & Warren, 1987; Weinberg, 1987; Gandy, 1988, 1993; Rice, 1988; Hiltz & Johnson, 1989; Schiller, 1989a,b). The technology may be as commonplace as the telephone (Pool, 1983; Rakow, 1988) or as specialized as the combination of computers, telescopes and communication technologies that allow us to gather information about explosions on the far side of Jupiter.

Access to technology sometimes means access to a range of media such as movies, newspapers, books, magazines, music, academic performance, television and the internet (Innis, 1951; McLuhan & Fiore, 1967; Dorr, 1980; Rogers, 1986; Greenberger & Puffer, 1989). Ordinarily, in these examples, someone else has created or produced what is available and technology serves as an information delivery system. Therefore some refer more explicitly to access to information as access to information systems for generating, storing, distributing information or representations of information in offices, libraries, government agencies and so on (O'Reilly, 1982; Bates, 1986; Budd, 1987; Sparck Jones, 1988; Borgman, 1989).

It is a common, but mistaken, assumption that access to technology equals access to information (Gillespie & Robins, 1989; Murdock & Golding, 1989). Although it may be true that access to information is enhanced, speeded, broadened or integrated through technology, technology is not sufficient to provide access on its own. For example, to gain access to information through a computer, the user must, at the very least, possess rights of use and knowledge of how to make use of software appropriate to the search. When more traditional media, such as television, are used in the search for information, such searches are necessarily more serendipitous and externally constrained in nature. Since television programming is under the user's control only to the extent that the user has the option of selecting from among existing programs, television is more likely to establish an agenda of interest for a viewer rather than to address a pre-existing need or question. When using a more interactive information delivery system, such as an online database, the user must have access to knowledge about institutional resources, select a database that matches both the content and the comprehension level of his or her search, be able to navigate the interface or the command language of the system and understand the nature of the results (such as abstracts or bibliometric descriptors) (Culnan, 1985; Star & Ruhleder, 1996).

If using a computer network or the Internet, the interaction can be even more complex. The user must have access to technology (a computer, modem and phone line or network connection), to communication software, to an account on the network and to knowledge of how to navigate it (Culnan, 1984, 1985; Star & Ruhleder, 1996). In addition, access to information is enhanced when the user also knows of appropriate listserves or bulletin boards with a critical mass of members and content (Williams, Rice, & Rogers, 1989) and when the

user is sufficiently experienced in use of both the technology and the Net to be able to search, upload, download and interact effectively. Access to a critical mass of other users and compatible infrastructures fosters the emergence and diffusion of large computer networks (Schaefermeyer & Sewell, 1988; Gurbaxani, 1990; Gattiker, Kelley, & Janz, 1996). Rafaeli and LaRose (1993) reported that critical mass factors (diversity of content and symmetry of participation, including posting and downloading) were more important than management policies (such as access fees, time limits, etc.) in predicting patterns of use on 126 computer bulletin boards.

Another common assumption, frequently not supported, is that system use equals access to information (Gerstberger & Allen, 1968; Singer, 1980; Baroudi, Olson, & Ives, 1986; Dervin, 1989; Hiltz & Johnson, 1989). Certainly, access to information relevant to the context and situation of a particular user at a particular point in time cannot be assumed (Dervin, 1980; Chatman, 1991). A library patron might successfully use an online catalog to identify materials in the collection relevant to a particular situation, but if the materials are in use elsewhere or are otherwise unavailable, system use may not lead to access to information. In a work situation, an employee may log on to the company's e-mail system immediately after arriving in the office, but may then spend the day in meetings elsewhere. Log records for the day would indicate the employee as a user for the day when, in fact, the system was not actually used to access information.

Communication technology can be considered a form of the more general concept of mediation. Mediation occurs when our natural individual abilities to create, transmit, receive and process visual, auditory, olfactory, gustatory or tactile messages are extended, expanded or enhanced technologically by media or interpersonally by human intermediaries (Ruben, 1993, p. 227). Mediation has the potential for two primary influences on access to information: it can intensify or compensate.

The intensifying potential of mediation operates when selected characteristics of the user or the system are intensified with use of mediating technology. The panoptic potential of communication and information technologies increases the likelihood both that surveillance will be carried out and that the data will be matched from different sources to produce a new set of data that would not otherwise exist (Zuboff, 1988; Botan & McCreadie, 1993; Gandy, 1993). The potential for intensifying positive characteristics is equally likely. For example, technologies can increase the possibilities for access to information (Frenkel, 1989) as was the case with the advent of the printing press or the international telephone service or more recently, with the free public availability of the PEN project in Santa Monica (Rogers, Collins-Jarvis, & Schmitz, 1994). Through PEN, all citizens, including Santa Monica's significant homeless population, can gain access through publicly available terminals and online accounts to a wide range of opportunities for information, communication, advocacy and participation in the political process. Possible outcomes of merged sets of data include the ability to provide crucial services or avoid dangerous interactions among medical treatments. Whether the intensifying of a particular characteristic is positive or negative is dependent on the perspective from which it is considered.

Alternatively, mediation and technology are often viewed as compensating for potential limitations in users or systems, spanning boundaries of time or space or overcoming physical, social, cognitive or other constraints that otherwise might block access to information. Technologies can bring information to those unable to travel due to physical limitations or responsibilities such as child care or a work schedule. Similarly, mediation can compensate for

limitations in procedural knowledge of the user or for a system design that is less than transparent. Consider a typical visit to a library. Depending on the need and experience of the user, access to the information sought may require as little mediation as a few minutes with a technological interface and a glance at a conveniently located map of the building to find the location of the information source identified through the online catalog. Or it might be more complex, requiring a lengthy interview with the reference librarian, an extended search of several online databases with the librarian acting as intermediary, directions to locating information sources available in the building, guidance in filling out requests for inter-library loans, printing out online articles or downloading files. In other words, specific mediations can compensate for some limitations, but not for others. Mediation and technology can compensate also for interpersonal or structural barriers to access to information. For example, in computer-mediated communication, individuals may overcome interpersonal barriers such as shyness to interact with others when they would be far less likely to do so face-to-face (Rice & Love, 1987).

Access to technologies also provides organizations with a wide array of potential changes, such as reinforcing and shaping the decision premises, revising the perception of information sources, augmenting the information processing capacity of organizations and altering the organizational structures to coordinate economic activity (Choo, 1996).

2.2.3. Access to communication

Access to information is sometimes viewed as access to communication, particularly if communication is understood as sense-making or moving through time/space to make sense of one's world (Dervin & Nilan, 1986). Access to information thus includes access to content, to comprehension or to retention (Dorr, 1980; Hill, 1984; Rice, 1988; Bates, 1993). Gaining access to such comprehension or understanding occurs only when communication is relevant to the individual information seeker, user or audience member.

Such access relies on a view of relevance that is determined not by matching query statements with bibliographic references, but by matching the applicability of what is ascertained to the everyday life of the individual (Freire, 1969; Bodker, 1989; Dervin, 1980; Chatman, 1991). This broader understanding of relevance includes factors that make it possible for the individual to make use of information in the sense-making process. For example, the format in which communication occurs is likely to influence the ability of the interactants to understand or make sense of information. If one is unable to see, a printed document is not very useful. Also, different individuals learn or understand better from different perspectives than others (Kolb, 1984; Belenky, Clinchy, Goldberger, & Tarule, 1986) or using different kinds of intelligence than those generally valued and encouraged in schools (Gardner, 1983).

Access to information can also imply access to connectivity (Dervin, 1980; Doctor, 1992) or to interpersonal networks (Crane, 1969; Granovetter, 1973; Rice & Borgman, 1983; Hiltz, 1986; Rice & Love, 1987). This is especially relevant in the context of access to technology, discussed above. Perceptions of ambiguous phenomena in general and new information technologies in particular, are likely to be influenced by the opinions, information, uncertainty reduction, behaviors and rewards or sanctions of salient and accessible others (Salancik & Pfeffer, 1978; Albrecht & Hall, 1991; Rice & Aydin, 1991; Fulk, 1993; Rice, 1993). For example, Anderson and Jay (1985) found a pervasive effect of social influence, as measured by the 'normative values' of other physicians with whom one communicated frequently on

adoption time of, use of, attitude toward and time between when the organization adopted and the physician started using, a hospital information system.

Communication competence is required for participation in the social, economic and political spheres of society (Gandy, 1988; Murdock & Golding, 1989). Communication competence is gained through access to and participation in communication practices. Therefore, those who gain access and who participate regularly are likely also to gain experience with such systems and processes, thereby improving further their communication competence and increasing opportunities and skills for access in the future. The converse is also true and the impact of such deficiencies tends to compound over time.

2.2.4. Access to control

Access to information can be understood as access to control of participation and of content (Mulgan, 1991; Doctor, 1992; Bates, 1993). The holder of a tv remote control, for example, gets to decide which channel to watch, how long to stay with that channel, the volume level or whether to browse through the channels at a leisurely pace, stopping to evaluate the offerings of a channel or to whiz through the channels until something eyecatching stops the process. Of course, there are still a few individuals who first consult a printed guide and select a program prior to turning on a television set. In either case, however, the individual is controlling what information is selected from the range offered, sometimes also controlling what is available for others.

Of course, the perspective from which one views the issues influences expectations for those implications. For example, Doctor (1991) identified polar positions as to how political and economic systems are likely to change in relation to control. A Luddite analysis (Webster & Robins, 1986) foresees the centralization of the tools of control and a widening gap between the advantaged and disadvantaged. By contrast, other analyses (for example, Cherry, 1985) posit the decentralization of control of information and subsequent decentralization of power.

Access to control can imply control over who gains access to what information to whose advantage (Braman, 1989). Attempts to gain such control occur in almost every context and at every level of human interaction. In the workplace, control over information flows is an ongoing concern, including who has access to what types of information, through work monitoring, whether overt or not (US Congress, 1987; Garson, 1988).

Corporations often go to great lengths to gain advantage in a particular market by gathering and protecting information about the potential buyers of their products and by gathering information about competing corporations and protecting against such information's becoming available to the competition. In other words, access to information can mean access to control or loss of it, depending on who holds control. When the institution is in the business of creating information, such as the entertainment or publishing businesses, then access to control can mean control of culture (Schiller, 1981, 1989b) and of what information is available for others. As the number of such institutions grows smaller with takeovers and consolidations, fewer and fewer sources of information or perspectives on any issue may be available (Schiller, 1989b; Bagdikian, 1990).

Media institutions are sometimes viewed as controlling the social or political agenda, less through overt intentions to do so, than by reflecting the dominant views or hegemonic constructs in programming decisions. Media systems thereby contribute to building consensus in support of those constructs (Hall, 1982) or, by determining what to cover on the nightly news, they set the agenda of interest among viewers (Protess & McCombs, 1991). Access to

such control over which cultural, social or political issues to air or what questions to raise carries with it the potential for bias in favor of those with privileged access over those seeking to gain access, those outside the publicly accepted frame of reference or constructs of logic.

In political terms and in terms of policy debates, access to control can also mean access to influencing policy with regard to information. Braman (1989) has documented that legal decisions are likely to favor institutions over the individual. Gandy (1993) argues that access to multiple data sources can lead to the creation of new data sets that can be applied to control future access to insurance or employment, for example. An institution is more likely than an individual to gain such multiple access. In gathering information about the individual that would not otherwise be available and of which the individual may not have knowledge, access to information by institutions that gives them control over individuals compounds what is already an imbalanced relationship.

2.2.5. Access to goods, commodities

Access to information can be understood to imply access to economic or social goods or commodities. From this perspective, access can carry with it costs, benefits and value (Culnan, 1984; Bates, 1988; McCain, 1988; Chatman, 1991; Hart & Rice, 1991). According to Mulgan (1991), control is never acquired without cost; increasingly decentralized access to networks requires increasingly complex centralized control. In fact, Bates (1993) argues that social, economic and political costs serve to control or constrain access to information.

Information behaves uniquely compared with other commodities in the marketplace. For example, the general principles of supply and demand as they relate to cost or value do not hold when applied to information. The value of information remains unknown until it is 'consumed' (Arrow, 1979; Hirschleifer & Riley, 1992). Information goods violate characteristics necessary to achieve social efficiency in that ownership cannot be enforced and public good externalities stem from characteristics unique to information use, in particular, lack of rivalry (information is not necessarily depleted for some as it is used by others) and lack of exclusivity (additional consumers can be served at potentially zero cost) in consumption (Hall, 1981). Conversely, individual contributions to the collective knowledge in organizations is an internal public good that enhances others' knowledge (Spender, 1998). From an economic perspective, because one can never know in advance the full content of information before gaining access, one can never really purchase a specific message, but only 'a set of possible alternative messages' represented by access to some content service (Hirschleifer & Riley, 1992, p. 168). Indeed, the very assumption and forms of information used to assess and evaluate information services can severely constrain or bias what resources and strategies are supported (Koenig, 1996).

Other characteristics of information contribute to further anomalies of information in the marketplace. Although copyright laws provide legal avenues for corporations to control and benefit from their information products, information remains infinitely reproducible (Bates, 1988). However, while the value of information depreciates as it becomes obsolete (Hall, 1981), it does not necessarily depreciate over time. Rather, the converse may hold: information may gain in value as it is consumed and increases in popularity, like Mozart's music after his death.

Access to information as a good or commodity carries with it implications for policy development. Access to information can influence or redistribute income, wealth or status. Because of its potential as a public good, information production is frequently subsidized by the government. In the past, such information (research) has been publicly available through

libraries, especially government depository libraries. As more such research has been contracted to private agencies, free public access has been curtailed as many libraries have not been able to afford the purchase price now imposed as a result of privatization (Schiller & Schiller, 1988). We are now in the position of having one government agency contract out a research job, then charging another government agency for access to the product of that contract. If one considers the issue from a different perspective, privatization of information production can also be viewed as having led to new markets for the information industry.

Yet a move toward privatization of information sources may limit consideration of ancillary social value, the additional value to society of use of information, in assessing value overall (Bates, 1988). Ordinarily in the marketplace, those commodities that have the greatest likelihood of being consumed are those that are produced. Privatization of information, then, carries implications for those in need of obscure or costly information. Hall (1981, p. 157) explains: "Markets for information goods which are both costly and infrequently purchased... will suffer the greatest distortion from asymmetrical information". Those with limited resources stand to gain more from access to information in terms of potential economic, social and political improvement than do others who start from a position of greater advantage (Gandy, 1988). Yet because they are also less likely to possess resources such as awareness of sources of information or the ability to express clearly their needs, they are less likely to gain access. As Chatman (1991) points out, the reasons for this are complex, but include factors such as ability to anticipate benefits, which is partially reliant on a belief that access to information truly of value to the life of the individual is likely. In addition to traditional economic costs, other potential costs of seeking or gaining access to information include the time spent weighing the costs and potential benefits of a search and the time it takes to carry out the process. The uncertainty or discomfort inherent in carrying out an unfamiliar process raise another cost. Ordinarily, greater levels of experience and familiarity with the situation and strategies of a search will decrease the costs of uncertainty or discomfort. This is not always the case, however. Consider the instance of a search that leads to information painful or disappointing to the user. Other potential costs fall in the category of risk: risk of losing time, money or face. A countervailing cost to all the above is the potential cost, both explicit and implicit, to the individual or organization incurred in doing without access to needed information. Implicit cost is likely when one remains unaware of information which would carry value in a given situation. Consideration of costs implies also resources, such as motivation, familiarity, patience, procedural knowledge, time or awareness of the range of sources available or of one's right to access. In addition, one must operate in a social environment that supports effective use of information or access to benefit from access to information (Doctor, 1991).

2.2.6. Access to participation

Democratic society is built on an assumption of an informed citizenry who can gain access to information. Implicit in the idea of access to information is that it leads to access to certain rights and lack of access to information can preclude access to those rights. Information is thus requisite to the right of participation in the political process.

In some instances participation is accessible through services, including government services (Gandy, 1988). The range of rights is not always known and necessary information about locations and procedures is often difficult to obtain if access is not common among members of one's social network (Chatman, 1991). Sometimes, access is most effectively gained through interactions outside one's network, with an individual or entity with whom/which one has

weak ties (Granovetter, 1973). The same can be said of access to information processing and retrieval services and to communication and information services and applies to those seeking to produce or exchange information, to interact with service agents (elected officials, for example) or to obtain information.

Particularly with regard to access to participation through political channels, access includes the right of advocacy, interpretation or debate. Without such access, an individual may be without resources required to benefit from access to information. Those without privileged access are left to struggle for access to even being able to raise questions or issues of concern in their lives (Hall, 1982).

The balance to access to participation is the right to privacy. Of equal consequence and occasionally in conflict with privacy rights, are security or ownership rights. This tension can be illustrated in considerations of caller-ID. Is the caller's right to security from revealing his or her telephone number more important than the privacy rights of the call's recipient, who may use the device to avoid intrusion by telephone marketers? These issues are potentially compounded when considered in the context of a huge network like the Internet, which facilitates the ability to interconnect. Privacy rights can also be thought of as access to non-participation.

Another form of access to participation is involvement by potential users in system and implementation design, which is crucial to successful information system adoption (Lucas, 1981; Ives & Olson, 1984; Markus, 1984; Hirschheim, 1985). Such participation improves potential users' understanding of the system, helps designers and implementers have better access to information about users' needs, increases users' emotional and political commitment to the system and even increases different groups' understanding of each others' work (Aydin & Rice, 1991). Information-based aspects of participation involve general understanding of the system, work group and supervisory support for learning about the system and organizational policies supporting learning about and experimenting with the new system (Ives & Olson, 1984; Johnson & Rice, 1987).

2.3. Facets of the information seeking process

Analysis of what is implied by access to information uncovers yet another issue of concern across the disciplines: facets of the information seeking process. In this case, the issue is more likely to underlie discussions of access implicitly than to be addressed explicitly. The very term, information seeking process, reveals an assumption of an intentional, rational, directed search for information on the part of an individual or organization. Of course, the dynamic process of access to information is more ambiguous, extensive and complex than that.

Traditionally, the information seeking process includes a problem or question (situation) and an attempt to find information to address the problem or question (strategies). Considerations of access to information in some disciplines focus on what occurs prior to a search (context) and what occurs as a result of a search (outcomes). Thus we consider four generic facets: (1) context or background in which the individual operates, (2) problem or situation that is to be addressed, (3) strategies applied in seeking access and (4) use of information or formulation of a new situation that occurs in the outcomes phase. Table 3 summarizes how these may be conceptualized across the various disciplines.

It appears rare for a discipline to consider the information seeking process in its entirety, despite a few exceptions (Dervin, 1992; Sonnenwald, 1995). In those disciplines that explicitly address the information seeking process, the focus seems to fall primarily on the strategies phase, with some attention to situation. Other disciplines demonstrate concern with the context in which access to information is sought. Others imply a concern with outcomes: what occurs once access is gained? In these instances, the concern with facets of the information seeking process is more likely to be implicit than explicit.

2.3.1. Context of information seeking

The context of access can be understood as the larger picture in which the potential user operates and the larger picture in which an information system is developed and operates and in which potential information may become available. Context includes all the precursors to information seeking such as the social, political, economic, educational and experiential context of the individual. From other perspectives, it includes also the economic, political and cultural context in which an information system is owned, developed and operated and the potential information itself in whatever abstract or concrete stage it or its potential exists.

Table 3
Facets of the information seeking process

Facet	Description	Including
Context	The larger picture in which the potential user operates; The larger picture in which the information system is developed and operates, and potential info exists	Precursors to information seeking; Social, political, economic, experiential context of individual; Economic, political, cultural context of development, ownership
Situation	The particular set of circumstances from which a need for information arises; Awareness (however vague) of a need for information	Gap, visceral need, discomfort, anomalous state of knowledge, information need, conscious need; Experience and standing with particular set of circumstances: relative status, perspective, cognitive, affective, physical resources; Range of system choices
Strategies	The dynamic process of addressing the situation, both planned and serendipitous; Formalized need, plan of action, query statement, problem statement; Interaction with system; informal evaluation; Iterations	Focusing, clarifying, expanding, redirecting of understanding of need for information; Bridges, barriers, blocks, helps encountered on way to address situation; Learning, refining, reconfiguring, reiteration; Resources: knowledge of range of system choices, knowledge of costs/benefits of pursuing search
Outcomes	Retrieval and use of information; Evaluation; Possibility of new situation	Access to the value or benefit of using information; Broader understanding of evaluation requires accounting for use, and relevance to both context and situation

In addition to accounting for the background and experience the user brings to a search, the context facet of the information seeking process also accounts for factors of particular concern in the mass communication literature, namely, creation and production of information distributed via mass media channels or diffused (Rogers, 1983) through a wide range of channels of communication. Context accounts for all those factors that carry across situations.

2.3.2. Problem/situation

Within the context in which the potential information seeker and an information system operate and the potential for information exists, problems and situations arise. Situation refers to the particular set of circumstances from which a need for information arises, along with the awareness, however unclear, that information may be useful in addressing the situation. The focus of most of the literature regarding the situation facet is that of the user or potential user of information or information seeker engaged in an intentional, directed search for information. Included here are concepts expressed in the literature as a gap (Dervin, 1992), visceral need and conscious need (Taylor, 1968), problematic situation (Wersig, 1979), anomalous state of knowledge (Belkin, 1980), discomfort or information need. These terms all refer to the awareness that something in a process of problem solving needs to be addressed, explained, challenged, supported or expanded, through access to and use of information. The experience and standing of an information seeker in regard to the particular set of circumstances are part of this facet.

In a given situation, an information seeker may have considerable expertise in the subject area; knowledge of the range of systems available to address the situation; experience with the operation of appropriate systems; adequate resources to overcome potential economic, political, physical and time constraints and sufficient status to gain access easily. For example, a college librarian seeking information on an educational matter covered extensively in literature published in journals carried by the library where he works, finds himself with adequate background and experience to gain access easily. The same librarian, however, facing a different situation, such as how to find adequate medical treatment for his child recently diagnosed with a neurological difficulty, may find himself a novice with little or no experience. For any individual, the degree to which he or she is a novice or an expert will vary from situation to situation. What one does to address the situation is covered in the next facet, strategies.

2.3.3. Strategies

The strategies facet represents the dynamic process of addressing the situation and includes both planned and unplanned actions, directions, interactions or discoveries. Although the entire process is potentially iterative, this is the stage most likely to be repeated, evaluated, revised, redefined, retried, adapted or replayed. This is the facet in which the user focuses, clarifies, expands, reconfigures or redefines one's understanding of the situation, what is needed to address the situation and how to go about addressing the situation. The dynamic nature of information seeking in general, and this facet of the process in particular, may well lead to adaptation or correction of the anomalous state of knowledge as the potential user encounters bridges, barriers, blocks or helps (Dervin, 1983) along the way. The user moves toward developing a formalized need (Taylor, 1968), a plan of action, a query statement or a problem statement, in short a more structured representation of the situation and what is required to

address it. The user may be an independent user or an organizational unit dedicated to understanding its environment and strategically influencing it, such as through strategic information systems (Cronin, 1996).

It is in this facet that the information seeker is likely to interact with the information system, whether that system is a restaurant or an online database. That very interaction may require the user to evaluate his or her mental model of the system and thereby change or adjust the expectations held for that interaction. In the course of negotiating strategies, the user may learn something new or encounter new data that raise new questions (Kuhlthau, 1985) or reevaluate the search or the interaction (Johnson & Rice, 1987). In the strategies facet the user may come to redefine the situation and may start over again in formulating strategies, such as allying with or acquiring other companies (Wigand, Picot, & Reichwald, 1997) or deciding to differentiate on the basis of product range, innovativeness, reputation, proprietary know-how, customer care, time-to-market, quality, customization, scope and focus or cost (Cronin, 1996).

Part of the evaluation process of the strategies facet includes weighing the costs and benefits of pursuing the search. This can be influenced by resources available such as motivation, time, convenience, level of tolerance for uncertainty, delayed gratification or inconvenience or a world view that sees the potential for addressing the situation as likely. Individuals vary in the styles they use in capturing and processing meaning from their situation, such as cognitive, affective or conative (action instinct), which may reflect a person's role and work task and which causes divergences and frustration over agreement on actions (Solomon, 1997b). For example, in Solomon's study, after workers in an agency exhausted close and familiar interactions, either a problematic situation was resolved, the problem was abandoned or they sought less accessible information and sources. Such informal evaluation of the potential risks and value is facilitated if the user already has a clear understanding of the problem situation and an awareness of the range of system choices available to address the situation. A more formal evaluation is not possible until access is gained and the information is used. Only then can the user gain access to the value of information. This leads to the outcomes facet of the information seeking process.

2.3.4. Outcomes

Outcomes include retrieval and actual use or consumption of information, as well as evaluation and possible redefinition and reiteration of the process. The outcomes facet of the information seeking process, though implied in discussions of access to the value or benefit of using information, is rarely examined explicitly in research on information seeking. Several information scientists and communication researchers (Belkin & Vickery, 1985; Dervin & Nilan, 1986; Tague & Schultz, 1989) have called for including outcomes in evaluating information retrieval services, but have also pointed out practical difficulties in attempting to do so. In the literature on mass media, however, some studies do explicitly examine how mediated communication (and, by implication, information) is used in everyday life (Radway, 1984; Kubey & Csikszentmihalyi, 1990) or how it is adopted, adapted and reinvented (Rice & Rogers, 1980; Rogers, 1983; Johnson & Rice, 1987).

It is in the outcomes facet that value is ascribed to information and access to the value or benefit of using information can be gained. Including outcomes in evaluating the information seeking interaction allows for a broader understanding of the notion of relevance, one that accounts for relevance to both the situation and the context of the user. Outcomes may include learning, focusing, reinventing or redirecting the situation, thus generating a new search or they

may influence strategies and serve as the catalyst for adaptation and further iterations of the strategies facet. Outcomes tie the information seeking process together, closing the loop among the facets and potentially influencing the context, situation or strategies facets.

2.4. Influences and constraints on access to information

By influences and constraints, we refer to those factors that make it easier, or more difficult, to access information. For example, researchers have long been aware that the quantity or quality of information available from a system is frequently less important to users than is the degree of ease with which they gain access to the information (Taylor, 1968). However, most studies interested in access to information systems have focused primarily on physical access or access to other individuals (Gerstberger & Allen, 1968; Culnan, 1983, 1984, 1985; Rice & Shook, 1988; Hiltz & Johnson, 1989; Hart & Rice, 1991). That is, they emphasize how physical access influences or constrains both the use and evaluation of information. Other influences or constraints on access to information — for example, cognitive, affective, economic, social and political influences and constraints on access to information, are also worthy of exploration. Table 4 summarizes how these are considered in the literature reviewed.

2.4.1. Physical influences/constraints

Physical access to information is described in several different ways.

2.4.1.1. Geography/demographics. Some assume that those who live in rural areas find access to information more difficult than those in urban areas (Hudson, 1988). Others dispute this (Larose & Mettler, 1989). It is commonly agreed, however, that technology and the potential for telecommunications and telecommuting can serve to ease some of the geographic and demographic limitations to access to information and can add to flexibility in transcending geographic constraints to access, in the context of employment (Kraut, 1989) and beyond.

2.4.1.2. Environment and ergonomics. Physical access is influenced also by the environment in which one operates. The environment can be thought of as part of the information flow network (Archea, 1977). The physical arrangement of the environment regulates distribution of and access to information, particularly with regard to the workplace or other environments in which more than one individual functions. The very way in which information is organized can influence access (Budd, 1987). Within the environment, the orientation of furniture, partitions, sources of light, etc., determines what is visually or audibly accessible and what is hidden. In this regard, environment accounts principally for information that is most likely to be accessible through observation of or interaction with others. The same considerations apply to the environment when relying on senses other than sight. If the environment is terribly noisy and the primary source of information is one that requires listening, access is hampered.

2.4.1.3. Space. Space can serve physically to influence or constrain access to information along dimensions of distance and proximity, openness and security and clarity or obstruction. Distance and proximity arise as physical influences or constraints on access. In general, that which is closer in space, especially if it is visible, is more likely to be accessible (Rice, 1988) and, in

Table 4
Influences/constraints on access to information

Influence/constraint	Examples/components	Implications
Physical	Geography, demographics; Environment: arrangement, orientation; Space: distance/proximity, open/secure clear/obstructed; Display: medium, format, information processing capabilities	Can lead to perceived availability or convenience, likelihood of system use; Influenced by physical abilities, limitations, geographical flexibility, complex power relations
Cognitive	Understanding: identifying need; Awareness: of means of addressing, of rights, entitlements, procedures; Literacy: verbal, quantitative, technical; Facility/skill: system, command language, protocol; Matching of user and system: content and language, mental model and expectations, learning style, organization of info	Requires matching between user and system, between user and representation of information available; Leads to questioning: notion of query statement as valid representation of need for information, notion of relevance; Influenced by educational, biological, social background/experience
Affective	Attitude toward information seeking, computing, interacting; Confidence/fear/trust; Comfort/discomfort; Motivation level	Influenced by perceived convenience, dependability, availability; Influenced by relative status, perceived control over situation, experience, resources, familiarity
Economic	Benefits: profitability, affluence, solutions, public good externalities, ancillary social value; Costs: price, money, time, inconvenience, discomfort, going without, risk (loss of money, time, face); Value, potential for value added: not known until information is used	Can lead to control of information: content; privacy, security concerns; Influences compounding effect, reinforcing link between socioeconomic class and informational class; Influenced by market forces, economies of scale, class membership, educational and social background, policy
Social	Cultural norms: privilege, struggle; Class membership and background; Social networks, electronic networks; Education: learning, skill level, competence; Competence: communication and technology; Experience: expert/novice, familiarity with system, situation	Influences type of information to which one has access, linking socioeconomic and informational class; Compounding effect influences access to privilege/lack over time; Influences whether individual is able to use access to information effectively
Political	Power, including knowledge, with special implications in democracy; Control: of information flow, of individuals, of public debate, of policy; Equity, participation: ability to understand and be understood	Influences individual's ability to exercise political rights and power; Influenced by communication competence, resources, social environment, existence of a right and awareness of that right

particular, proximity to a system tends to increase likelihood of its use (Hiltz & Johnson, 1989). However, it cannot be assumed that physical proximity and information access necessarily follow one another (Culnan, 1984). Other factors may come in to play, such as timing, ease of use, experience, etc.

Whether a space is open or closed can influence access to information. Closed can also be thought of as secure. Therefore, another way to think about this is to consider whether information is publicly available or available only with access to a secured or locked area or system. If the latter, the user will likely need resources, such as security clearance, a key or a password in order to gain access. In an open area, one might feel uncomfortable or embarrassed or suffer performance anxiety, thus reducing perceived access. The same open area might influence another user differently, however, leading to ease in locating appropriate sources of assistance and thereby increasing perceived access.

The path of the system and the needs or capabilities of the user must match in order for one to gain access to information (Culnan, 1985). Of course, obstructions can arise in multiple forms, not all of them physical. The physical capabilities of the user, however, can influence what is accessible. For example, much information for those in wheelchairs is physically obstructed. On the other hand, if the same information can be provided through mediation, such as over the telephone or uploaded to a computer network to which the same user has access or delivered through an intermediary, an alternate, clear path is available.

2.4.1.4. Display. Along somewhat the same lines, the form in which information is displayed or exchanged must also match the needs of the potential user for access to occur. Browsing for information, for example, requires that the potential sources of information be on display in some manner for scanning or consideration by the potential user (Chang & Rice, 1993). Similarly, the medium must match the physical abilities of the user, so that if the user is unable to see, then print is an inappropriate physical display of the information. In that case, a human or computer reader or an audio tape might provide adequate access to the same information. The literature on media richness and managerial channel selection considers the related issues of the extent to which different media are more or less 'information rich' or have greater 'social presence' (Rice & Case, 1983; Daft & Lengel, 1986; Dobos & Jeffres, 1988; Fulk, Schmitz, & Steinfield, 1990) and thus are considered more or less appropriate to the task and the social setting. For example, computer-mediated communication may decrease effective information exchange within groups compared to face-to-face, especially when there is less pre-discussion conflict about the decision (Hightower & Sayeed, 1996), indicating that display factors may constrain surfacing of potentially conflicting information. Similarly, teleworkers may have greater access to explicit organizational and task knowledge via online information systems, but less access to tacit knowledge due to fewer opportunities to training, socialization and work conventions (Raghuram, 1996).

2.4.2. Cognitive influences/constraints

2.4.2.1. Understanding. One's understanding that a need for information exists and the level of understanding of that gap, problematic situation or anomalous state of knowledge most certainly influence the likelihood of gaining access to information to address it (Dervin, 1980;

Budd, 1987). Closely tied to understanding or identifying the need for information is the understanding of the domain of interest, given the situation. Every user is a novice in some domain and is also likely to be expert in at least one (Cuff, 1980). Depending on the domain, the level of cognitive understanding of the domain of interest will influence what information is truly accessible in the sense that it is intelligible to the potential user. Even given an understanding of the need that is closer to conscious rather than visceral need (Taylor, 1968) and a well developed understanding of the domain, additional cognitive factors influence access. Managerial understanding may be swamped by bounded rationality, information overload and fragmented attention (Katzer & Fletcher, 1996). Information errors in managing teams are often due to barriers of information unavailability (due to, say, costs or ignorance) or communication inaccuracy (due to divergence in interpretations or channel problems), requiring corrective effort during the team process (such as design) or after the outcome (such as production or service) (Safoutin & Thurston, 1993).

2.4.2.2. Awareness. To gain access to information, a user must be aware that the means of addressing the situation are available (Gandy, 1988; Chatman, 1991; Mulgan, 1991; Auster & Choo, 1996). In order to pursue information about a local school district's budget, for example, a citizen must first be aware that budgets are prepared and published. An additional component of this factor is awareness that as a citizen one is entitled to request copies of such budgets and that it is one's right to attend and participate in meetings of the school board of directors. Awareness refers also to procedural knowledge or awareness of how to move forward or what steps to take to begin to gain access to information (Budd, 1987; Rice, 1988).

Information sources (such as books, periodicals, people, electronic, other) and communication channels (such as inhouse phone, outside phone, inhouse library, outside library, inhouse specialist, outside specialist, open discussion, workshop/seminar, conference/meetings, e-mail, US mail, bookstore, personal files) influence some aspects of diffusion, but not all equally, and not uniformly across phases of the innovation itself. For example, organizational factors increase the influence of sources and channels for the more incremental innovation, but not for the more radical innovation in an analysis of requirements versus database design (Nilakanta & Scammel, 1990) and the value of internal and external information sources changes across technology life cycles (Rosegger, 1996). Awareness, therefore, includes awareness of sources, channels and means of addressing the situation, awareness of one's rights and entitlements with regard to access to that information and awareness of how to proceed in the information seeking process, taking into account different conditions such as type of innovation.

2.4.2.3. Literacy. Because print represents a significant proportion of sources of information, one's reading or literacy level is likely to influence access to information. Given the diffusion rate of technological mediation as the primary means of access to information, technological competence becomes a major influence or constraint on access. Current research, measuring prose, document and quantitative literacy (Kirsch, Jungeblut, Jenkins, & Kolstad, 1993), indicates that nearly one half the US population, age sixteen and older, lack literacy skills adequate for functioning in the workplace. These results mean that millions of citizens in this country alone have limited access, at best, to traditional sources of information.

2.4.2.4. Facility/skill level. The facility or skill level with information systems is likely to influence the information seeker's ability to access information. It is also likely that both past experience and the design of the system will influence that level. Included are skill levels in navigating an interface or interface protocol (Rice, 1988) and with the command language of a system (Culnan, 1985). Some systems require a higher skill level than others and therefore, their level of complexity influences the skill level necessary to gain access. Skills necessary for information professionals to access information and provide added-value services must increasingly be multi-disciplinary in order to understand and respond to the diversity of contexts (Herring, 1996).

Constraints on equal access to information and to shared interpretation of actions (and non-actions), may be especially difficult for mediated teams. Cramton (1997) studied 13 dispersed teams of business and information systems graduate students and their faculty, who used only asynchronous electronic communication (e-mail, group decision support system, telephone and fax). Problems of information distribution and interpretations were 'rampant', influencing their interpersonal and collaborative relationships and were categorized into these types of information problems: failure to communicate contextual information; difficulty in communicating the salience of information; unevenly distributed information; differences in speed of access to information and difficulty interpreting meaning of silence. On the other hand, written notes and e-mail can provide the means for in-process requests for information or comment and are used to focus on or signal misunderstanding, disagreement, uncertainty, equivocality and the need to make collective sense of something (Solomon, 1997b). Without advanced information management skills, members of distributed mediated teams will have difficulty establishing shared understanding of the situational reasons behind apparent problems and conflicts (Cramton, 1997).

2.4.2.5. Matching. Matching between system and user is necessary along other dimensions of cognitive influence. For example, the needs of the user and the offerings of a system must match with regard to content and language. If the system is designed or programmed with a model of a user that is not at all representative of how the user operates or if the user's mental model or expectations for a system are off base, the match is not adequate. A simple example that arises frequently in a community college library occurs when a potential user enters the library expecting to find either highly technical information or the latest popular novel. Because the library's collection is built to support the two-year curriculum only, the user is likely to be disappointed in either search, indicating that the match between user and system is not adequate.

Access is similarly influenced or constrained according to how well matched are the system and user with regard to information processing, learning or intelligence styles (Gardner, 1983; Kolb, 1984; Borgman, 1989). Learning styles of some users lend themselves far more successfully to processing visual information or to learning by doing rather than by reading. Also, learners develop through an epistemological maturation process (Perry, 1970) and they may do so differentially according to factors such as gender (Gilligan, 1982; Belenky et al., 1986; Jansen, 1989). To the extent that higher mental functions are socially formed and culturally transmitted (Vygotsky, 1978), then human cognitive processes differ according to cultural phenomena (Luria, 1976). A classroom is an ideal illustration of the potential influence or constraint on access to information of such a match or its lack (Freire, 1969; Belenky et al.,

1986). Students who learn more readily through doing than through reading or listening will be more likely to grasp the information at hand if the class is run as a workshop than in a reading and lecture format. Thus the degree of matching between what the user needs and can make use of most effectively and what and how the system makes available its resources, can strongly influence the degree to which the interaction leads to access.

2.4.3. Affective influences/constraints

Less has been written about affective influences and constraints on access than about other categories.

2.4.3.1. Attitudes. Observation of students as they attempt to find their way in a library reveals that the students' own attitudes about their competence or experiences influence their attempts to gain access. Those who are fearful are often afraid of feeling or appearing 'stupid' or inadequate. Attitudes toward information seeking, toward computing (Rice, 1988) or about an information system's convenience (Culnan, 1984), dependability (Culnan, 1985) or availability (Culnan, 1983) may all influence one's decisions about whether or not to pursue access in a given situation.

2.4.3.2. Confidence, fear, trust. Technology attitudes may influence, also, further affective components such as confidence, fear or trust (Hochschild, 1983). Those who have had less than optimal experiences with seeking information in the past may be more likely to feel apprehensive or unsure as they approach another information seeking situation. Confidence and fear are related to the degree to which an information seeker perceives him- or herself to be in control of a situation. This in turn is related to relative status, experience and supply of resources. Trust between interactants influences how information is exchanged and interpreted (O'Reilly, 1978), how willingly a potential user pursues access and how willingly an intermediary or information source facilitates the process. Affective influences enable some to manipulate the behavior of others or to manipulate messages or the information flow. It is the job of collection agency employees, for example, to manipulate others into feeling fearful, unworthy and threatened, thereby making them more likely to reveal information about themselves or their financial situations (Hochschild, 1983). In some instances, it may be the job of librarians or teachers to manipulate others into feeling confident and capable of gaining access to information.

2.4.3.3. Comfort/discomfort. Some experience obvious discomfort as they attempt to gain access to information (Kuhlthau, 1991). Because every information seeking situation is unique, it is rare for any user to move absolutely comfortably through the process. For some, affective influences are sufficient to preclude their taking on the search process or they may easily become frustrated or discouraged and give up the search without gaining access. Users are more likely to experience comfort in a familiar setting, in using a familiar system or protocol or in dealing with a familiar situation (Cuff, 1980). A user who is familiar with practices and procedures in a courtroom, for example, is less likely than a newcomer to experience symptoms of anxiety in that setting. The same user may feel extremely uncomfortable, however, in another information environment such as a bar or a hospital.

2.4.4. Economic influences/constraints

Economic influences and constraints include three basic components: anticipated benefits, costs and value.

2.4.4.1. Benefits. Access to information can be viewed as a process of weighing anticipated and realized benefits of access against the costs of access (and, as noted above, usually to an information source or service, not really to specific information itself). Benefits can take many forms, such as profitability, or more abstract ones, such as gaining access to information that is used to address or seek a solution to a problematic situation. Benefits also include public good externalities and ancillary social value, the additional benefits to the public good or society derived from information's availability or repeated use (Hall, 1981; Bates, 1988). At the evaluative level, one benefit of gaining access to meta- or second-order information (such as the credibility of a source or a source's realm of expertise) is that one can then assess the likely value of first-order information (specific information about events or objects in that realm) (Hirschleifer & Riley, 1992, p. 169). Thus one sense of access is, indeed, to second-order knowledge just to be able to decide whether to attempt access to first-order information (this can be couched in Bayseian theory as a problem of shifting prior probabilities to posterior probabilities).

From another perspective, it is beneficial to gain access to creating, producing or distributing information. This includes potential financial benefits, along with the benefit of determining what information is available for others. As the number of corporate owners of sources of information such as television and radio broadcasting, book and periodical publishing and film and video production grows smaller (Bagdikian, 1990), the number of perspectives and the range of ideas represented can become dangerously limited, leading perhaps to a very small group's gaining exclusive access to an enormous potential to influence and shape our culture (Schiller, 1989b).

2.4.4.2. Costs. Some costs are explicitly monetary. For example, an online database search carries with it a set of financial costs. In some instances these costs are absorbed by the system, in some they are offset through mechanisms such as selling advertising time or space and in others the costs are passed along to the information seeker. Organizational policies that place explicit and activity-based costs on e-mail usage will suppress early adoption, thus reducing the likelihood of achieving critical mass, necessary for widespread adoption and will also transfer activities to communication media that are not explicitly charged to the organizational user, such as telephone or mail (Rice, Hughes, & Love, 1989). To watch television, a viewer either pays for programming through purchasing advertised products or pays for programming more directly through cable fees or subscriber donations.

Other costs may be less quantifiable. For example, it may be difficult to quantify the costs of time, inconvenience and annoyance experienced while attempting to gain access to information through a phone system that first, is busy for 20 min and then requires the information seeker to hold through recorded messages, pressing buttons in response to queries until finally, 35 min later, a human voice answers. For some, time spent waiting may also represent loss of income and, therefore, represents both a quantifiable and social cost. Of course, the costs of gaining access to information require information, to which one may not have full access, so information about the costs of access to information are important. Lack of access to

information about the costs of access can certainly add to frustration levels, thereby further increasing the social cost of access.

Clear goals and the motivation to achieve them exemplify a balance against costs (Budd, 1987), so that those with greater motivation (Chatman, 1991) or as noted above greater awareness of the value of second-level information, may be more willing to take on access costs, especially to first-order information. However, the individual's world view may also influence how accurately he or she is likely to anticipate benefits. For example, non-elites tend to function with an emphasis on immediate gratification, so the benefits of access to information, if not immediately obvious, may be less likely to be trusted or anticipated (Chatman, 1991). Motivation can serve as a balancing influence against affective constraints of a search. The situation or need for information may be of sufficient import to outweigh the uncertainty, lack of confidence or discomfort. In fact, a feeling of discomfort is more likely to generate or motivate a search than is a comfortable situation. Motivational factors can include economic or political relationships or health and family concerns, for example. They are influenced also by the user's perceived need for and store of resources.

Any consideration of costs also must take into account the potential cost of doing without information (Koenig, 1996) or of not gaining access to information necessary to address a situation, solve a problem or carry out a new project. This is one type of cost that can be described as risk. Others include risk of losing time, losing money or losing face (Culnan, 1984).

2.4.4.3. Value. If one weighs the costs against potential benefits and pursues the search, the ultimate objective of access to information is to gain access to the value of that information. Value requires the ability to anticipate benefits and, in the case of information, is not fixed (Bates, 1988) and requires use of the information itself (Arrow, 1979). Use, however, does not assure that value is realized or understood. Access to the value of information requires the belief that such access is likely (Dervin, 1989) and requires a match between expectations, needs and abilities and what is offered. Value can be accessed by both individuals and by social groups and the need for access can be more urgent when the potential for value added is greatest (Murdock & Golding, 1989).

2.4.5. Social influences/constraints

Social factors represent another set of influences and constraints on access to information.

2.4.5.1. Cultural norms. According to Hall (1982), there are two social groups with regard to access: those with privileged access and the power to signify terms of the debate and those who must struggle to gain access. For those among the latter group, not only can it be difficult to gain access to relevant information, but such information may not exist at all because others who are likely to be oblivious to issues of import to the latter group set the agenda and select what is to be reported on, debated, discussed, researched or questioned. Cultural norms also influence which technologies are developed, sold and implemented (Braman, 1989). To understand the role of technologies in access to information, they must be taken as part of the larger social context and processes (Slack, 1984) or thought of as a social phenomenon that shapes and is shaped by its host society (Doctor, 1991). Even institutional resources, such as programs for battered women, may involve considerable barriers to information due to personal, family

and cultural norms about disclosure, responsibility, morality and legality (Harris & Dewdney, 1994).

2.4.5.2. Class membership and background. One's class membership has the potential to act as a social influence or constraint on access to information in that class determines the type of information to which one has access. Often one's social class influences the range of employment opportunities which, in turn, influences the range of information to which one has access. This is illustrated among the poor, who demonstrate lower expectations about the likelihood of success in unfamiliar endeavors or situations (Chatman, 1991) and are, therefore, more likely to continue in the most familiar surroundings, patterns and occupations. Family, ethnic background and gender can also influence or constrain access. The family's use of media is the strongest predictor of the likelihood that one will take advantage of access to information through a range of media including books, magazines, television, museums, newspapers, video, academic performance (Greenberg & Heeter, 1987) or computer mediated communication (Doctor, 1991). Also, those who grow up in families in which members seek out information are more likely to be aware of information systems and of their rights with regard to access to information.

2.4.5.3. Social networks. Social networks influence who has access to what information or technologies (Gandy, 1988; Mulgan, 1991). In many instances, access to information comes about serendipitously, through unplanned encounters or conversations with others. The exception is when an information seeker is in a situation which requires information not normally or not frequently needed among the individual's social networks. For example, if one is seeking information regarding abortion, it is not a topic about which a great deal is known in many social circles and an individual is rarely likely to need such information repeatedly. In such a case, the individual is more likely to gain access to information through weaker ties (Granovetter, 1973) than through those with whom one is more familiar. The more common influences of social networks on access to information, however, are exemplified in considering the invisible college (Crane, 1969), in which scholarly work is shared informally through interpersonal networks (even if mediated by computer networks) long before it appears in published form.

Social networks also influence the environment in which information, once accessible, is perceived or used. Social and work networks can influence one's attitudes and, thereby, one's expectations and use of systems to access information (Rice & Aydin, 1991). In order to gain access to the benefit of information (Doctor, 1991), even given access to information, the individual requires a social environment that enables and supports effective use of that access. Access through one's social network to advice, analysis, interpretation and debate, is often required to make the best use of access and to participate as a citizen (Murdock & Golding, 1989).

2.4.5.4. Education. One's educational background includes learning, skill level and competence as well as formal schooling. An individual with a higher level of education is likely to encounter fewer constraints in attempting to gain access to information, in part because educational level not only influences access directly, it also is likely to influence one's social network and levels of communication and technological competence, as well. One who has learned to cope

with new situations or problems is more likely to have developed the skills necessary to do so again. Learning and skill level are both cumulative, particularly with regard to access to information (Budd, 1987). As one becomes familiar with information tools and the information seeking process, the skill level increases and access becomes easier. Again, however, there are exceptions according to the situation from which the need for information arises. Higher education can preclude knowledge of or access to other kinds of information, such as practical or manual.

2.4.5.5. Competence. Given awareness of the means of addressing and the right to address the situation, competence in expression, as well as in print and technological literacy, comes into play. Those more able to express their need for information are more likely to gain access (Taylor, 1968; Budd, 1987; Gandy, 1988). Both communication competence (Gandy, 1988) and technological competence can influence or constrain access to information. Competence compounds over time and use (Doctor, 1991). As is true of education, the degree to which competence influences or constrains access varies by situation (Cuff, 1980).

2.4.5.6. Experience. One's level of experience and expertise will be situation- and domain-specific. Any one individual is likely to be expert on some situations and a novice in others. Repeated use, especially successful use, is likely to increase one's level of expertise with any given system, as well as with system use in general (Rice, 1988). Familiarity and successful past use of an information system are likely to increase the potential for a user's having developed appropriate techniques to gain access to information (Culnan, 1984).

2.4.6. Political influences/constraints

Political influences and constraints are particularly salient in a democracy, which requires widely accessible information.

2.4.6.1. Power. Limitations to access to information carry grave implications for a participatory democracy (Gandy, 1988). Power influences policy, how it is developed and whom it favors. In a democratic society, an informed citizenry is in a stronger position to counter those who would develop policy unfairly. As Buckland (1990) explains, Francis Bacon, around 1600, wrote not that knowledge is power, but rather that ignorance is a source of weakness. Knowledge, being the opposite of weakness, is therefore a source of power. Conversely, power can be used to limit access to information, thereby limiting access to knowledge, a source of power. Organizational roles and structures both facilitate as well as constrain individuals' abilities to manage their information environments, such as whether a manager can perform a decisional, resource allocator, disturbance handler or negotiator role (Auster & Choo, 1996; Katzer & Fletcher, 1996).

2.4.6.2. Control. Political influences and constraints on access to information can be used to control information, such as through copyright or privacy laws (Mulgan, 1991) or through control of information systems and flows of information. Control of the marketplace can also influence access to information through control of cultural institutions, which can serve as a vehicle for control of the course of public debate or the setting of the public agenda.

Questions arise as to who controls access to information about the individual in the form of data gathered through monitoring the individual's workplace performance or through pre-employment screening, which may require blood or urine samples from the prospective employee. At present, the Federal Bureau of Investigation is establishing a databank on the criminal population, gathering DNA data derived from blood samples required of convicts. Each state determines the specifics on who is required to participate. In some states, the samples are required only from those convicted of violent, sex-related crimes. In Virginia, however, any prisoner convicted of a felony must provide a blood sample. The Council for Responsible Genetics worries that the collected data and perhaps the biological specimens themselves, which were obtained without consent, will be made available for inappropriate applications. They voice concern, also, that access to such information will not be appropriately controlled, leading to the potential for access to the databank by insurance companies or by prospective employers.

Managerial control may be possible for some explicit individual (conscious) or explicit social (objectified), but less so for implicit individual (automatic, though critics of organizational ideology would argue that many assumptions and acceptable dialogues become automatic) and largely unsuccessfully for implicit social (collective) knowledge (Spender, 1998).

2.4.6.3. Equity and participation. Democracy requires equitable access to advice, analysis, interpretation and debate, as well as to some goods and services which are necessary resources for citizenship (Murdock & Golding, 1989). Equity and participation require not only access to information, but also access to the right and the means to inform others (Dervin, 1989). Levels of communication competence can thereby influence one's ability to use information resources to improve one's quality of life (Gandy, 1988).

3. Conclusion

This part I of two articles, based on a review of six research literatures (library studies, information science, information society, mass communication, organizational communication and economics of information) that consider access to information from different vantage points, identified four primary components of a comprehensive framework underlying the varied discussions in the six literatures: (1) conceptualizations of information itself, (2) conceptualizations of the notion of access, (3) a set of general information seeking facets and (4) a variety of influences and constraints.

This integrative and comprehensive approach highlights the many potential perspectives and issues involved in information access. It provides an initial vocabulary for communicating about access. In this way, the strengths and concerns of any particular research literature or of any particular stakeholder, can be applied to improving access in both general and specific situations, but the systematic dimensions of conceptualizations of information and access or facets and of influences and constraints, should make us more aware of the limitations and specialized focus of any particular literature or stakeholder. The full implications of and obstacles to access to a book in a library, for example, are not defined only by either a patron or a reference librarian. So neither can fully develop comprehend the broad and interconnected system surrounding this particular situation and neither could satisfactorily design a system (whether computer-mediated or not) or develop policies that would speak to all the relevant

issues. Understanding and applying these multiple dimensions should contribute to theories about communication and information, the appropriate application of research methods to access questions, individuals' understanding of their rights and situational constraints and the design and use of communication and information systems.

These components are not treated equally, or in some cases at all, across the six literatures. Thus, part II will identify and discuss unique conceptualizations of access to information across the disciplines, suggest implications of both the common and unique perspectives and propose an integrative framework for considering the diversity of issues and approaches in the concept of 'access to information' (McCreadie & Rice, 1999).

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