

# Facilitating Community Information Seeking Using the Internet: Findings from Three Public Library–Community Network Systems

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**We report findings from a recent study of how public libraries are using on-line community networks to facilitate the public's information seeking and use in everyday situations. These networks have been lauded for their potential to strengthen physical communities through increasing information flow about local services and events, and through facilitating civic interaction. However, little is known about how the public uses such digital services and what barriers they encounter. This article presents findings from a 2-year study that comprised a national survey with public library staff, followed by extensive case studies in three states. At each site, data were collected using on-line surveys, field observation, in-depth interviews, and focus groups with Internet users, human service providers, and library staff. The on-line surveys and the follow-up interviews with respondents were based on sense-making theory. In our article we discuss: (1) how the public is using networked community information systems and the Internet for daily problem solving, (2) the types of barriers users encounter, and (3) the benefits for individuals and physical communities from public library–community networking initiatives and the emergence of “information communities.”**

## Introduction

Despite the lauding of the Internet's potential for strengthening physical communities by facilitating information flow about local resources and civic interaction through

formal and informal channels, findings from recent studies (e.g., Kraut, Lundmark, Patterson, Kiesler, Makopadhyay, & Scherlis et. al., 1999; Nie & Erbring, 2000) suggest that Internet use has the reverse effect by isolating individuals and decreasing interpersonal interaction. This finding gains greater significance given Putnam's (1995, 2000) observation regarding the decline of social capital in physical communities. Thus, life in an electronic world poses several fundamental problems for which research is needed. Two such questions that are only beginning to be addressed are: (1) how do individuals use the Internet when seeking information for daily situations? and (2) How do local Internet initiatives strengthen physical communities, especially with regard to social connectedness?

Past studies suggest that equitable and easy access to information about local resources can help people deal with the myriad situations that arise through everyday living such as finding a new job, locating daycare services, dealing with grief or divorce, moving to a new neighborhood, finding where to get your car fixed etc. (Chatman, 1996, 2000; Chen & Hernon, 1982; Dervin et al., 1976; Durrance, 1984a, 1988; Harris & Dewdney, 1994; Pettigrew, 2000; Savolainen, 1995). However, these same studies reveal that all people—despite their education, financial status, occupation, or social ties—experience situations where they have difficulties in recognizing, expressing, and meeting their needs for such community information (CI). Barriers including cultural, financial, geographic, and physical further challenge users with successfully seeking CI such that they cannot always obtain information about needed ser-

vices or participate fully in civic life. Although information technologies hold significant promise for linking individuals with information and one another, they are foreshadowed by the potential for a deeper digital divide between the information rich and the information poor.

Recognizing the importance of CI for making a difference in people's lives and, on a related level, for creating and sustaining healthy communities, many public libraries have focused on providing three types of CI: human services information, local information, and citizen action information (Durrance, 1984b). In addition to providing CI through information and referral (I&R) services since the 1970s, public libraries organized and supported community-wide information initiatives with local service providers (Baker & Ruey, 1988; Childers, 1984). The Internet, however, along with faster connectivity, wider variety of enabled devices (PCs, public kiosks, etc.), and enhanced graphical user interfaces, has suggested new ways for libraries to facilitate the public's everyday information needs through digital CI systems. One such digital collaboration in which libraries have played a leading role since the 1980s, and which is flourishing worldwide, is community networking. These networks provide the public with one-stop shopping using community-oriented discussions, question-and-answer forums, access to governmental and social services, along with local information, email, and Internet access (Cisler, 1996; Durrance, 1994; Durrance et al. 1993; Durrance & Pettigrew, 2000; Durrance & Schneider 1996; Gurstein 2000; Schuler, 1994, 1996). Although individuals may interact with other users by posting queries, monitoring discussions, etc., CI is often a central network feature that appears in many forms: libraries, for example, may make their databases accessible through the Internet, while individual social service and other providers can post information about their programs. Thus, the architecture of the Internet makes digital CI possible by linking information files created not only by single organizations such as libraries, but by agencies, organizations, and individuals throughout the community (and, of course, the world). This is a major departure from traditional I&R services where librarians and other CI agency staff work with files about the community that are created on an internal library system. As a result of digital CI systems accessible through community networks, people can access CI through public library terminals—or any Internet-enabled device regardless of location—while seeking help with related information search techniques from librarians. In short, digital systems mean that citizens can access CI anytime, in any place.

To date, little is known about how access to digital CI systems help (or do not help) citizens with daily living, how CI affects their information behavior, and how it may or may not benefit communities. In a recent literature review (Pettigrew, Durrance, & Vakkari, 1999), it was observed that research interest in citizens' use of networked CI is increasing. However, the majority of articles reviewed were applied and descriptive in nature, and based on questionnaires or analyzed transaction log data that focused on

user socio-demographics and system or access statistics such as page use frequency (which confirms findings from a related review of the networked literature by Savolainen, 1998). Most studies were from the professional literature and reported conflicting user and use statistics. In this sense, the networked CI system literature has been akin to the general public library literature that Zweizig and Dervin (1977) criticized as providing little insight into the uses that people make of information and information systems. One study of particular note, however, is Bishop, Tidline, Shoemaker, & Salela (1999). Through interviews and focus groups in low-income neighborhoods with users and potential users of the Prairienet community network, they identified the following categories of digital CI need: community services and activities, resources for children, health-care, education, employment, crime and safety, and general reference tools. They recommended that librarians might provide more effective digital information services if they focus on ways that complement citizens' lifestyles, constraints, and information seeking patterns.

### Help-Seeking in an Electronic World

As an exploratory study aimed at yielding rich data, multiple methods were used to collect data over several stages. Stage One consisted of a national survey with 500 medium and large-sized public libraries regarding their involvement with digital CI systems (Durrance & Pettigrew, 2000). For Stage Two, we used a standard case study design to conduct intensive research in three communities that received had national recognition for their respective community network and in which the local public library system played a leading role:

- (1) NorthStarNet ([nsn.nslsilus.org](http://nsn.nslsilus.org)): established in 1995 by the Suburban Library System, and serving Cook, DuPage, Kane, Lake, McHenry, and Will counties in Northeastern Illinois;
- (2) Three Rivers Free-Net ([trfn.clpgh.org](http://trfn.clpgh.org)): established in 1995 by the Carnegie Library of Pittsburgh, and serving Southwestern Pennsylvania;
- (3) CascadeLink ([www.cascadelink.org](http://www.cascadelink.org)): established in 1996 by the Multnomah County Library and serving the city of Portland and Multnomah county in Oregon.

Data collection methods at each site included (a) an on-line survey and follow-up telephone interviews with adult community network users who accessed CI Web pages, along with (b) in-depth interviews, field observation, and focus groups with public library–community network staff, local human service providers, and members of the public (all instruments are available in Durrance and Pettigrew (2002) and at our website ([www.si.umich.edu/libhelp/](http://www.si.umich.edu/libhelp/))). The survey was posted (during different time periods) on the main CI page of each network. The ways we addressed methodological concerns when conducting online surveys (c.f., Witte, MAmoroso, & Pen, 2000, and Zhang,

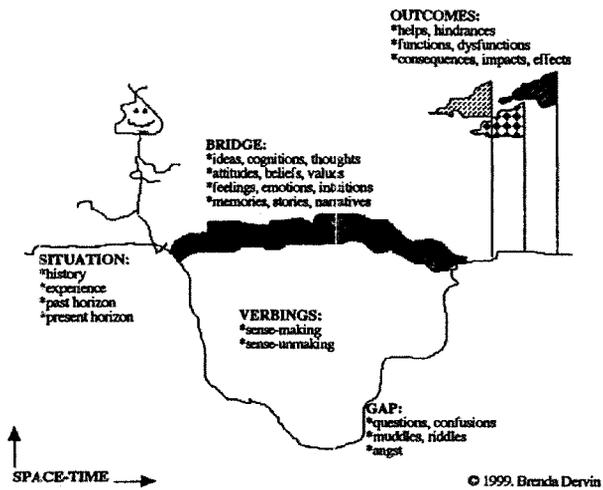


FIG. 1. Dervin's sense-making metaphor (Dervin & Frenette, 2000, p. 74).

2000) are discussed in Pettigrew and Durrance (2000). On average, the survey was posted for 73 days on each network and 197 users responded in aggregate. Across the three sites data were collected from a total of 87 library staff with community network responsibilities, human service providers, and other individuals.

Both the on-line user survey and follow-up interviews were based on Dervin's sense-making methodology (c.f., Dervin, 1992, 1994, 1999; Dervin & Frenette, 2000; Savolainen, 1993), which comprises a set of user-centered assumptions and methods for studying the uses individuals make of information systems. It asserts that throughout daily life, people encounter gaps in their knowledge that they can only fill or bridge (in Dervin's terms) by making new sense of their situations through seeking information. Thus, they use varied strategies to seek and construct information from different resources or ideas as they cope with different barriers, which Dervin and Frenette (2000, p. 74) explain using the sense-making metaphor (Fig. 1).

Sense-making facilitates the study of different aspects of information behavior. Our research included two dimensions: (1) users' assessments of the helpfulness of digital CI, and (2) users' and service providers' constructions or images of these systems. Both were investigated using Dervin's micromoment time-line technique where respondents were asked "to reconstruct a situation in terms of what happened (time-line steps) [and then] to describe each step in detail" (1992, p. 70). This enabled us to gather and compare the perceptions of different players regarding how CI is constructed and used through electronic communication. The framework's social constructionist orientation suggested it would be viable for studying citizens' information behavior when seeking help for everyday problems on-line. Hence, our research questions focused on the types of situations that prompt individuals to use (and not use) digital CI systems for everyday help, the specific types of CI that they are seeking, the types of barriers users encounter and how they deal with them, and how they are helped by

networked CI. Our study also focused on how public librarians and community service providers perceive that digital CI systems help their clients, their own organizations, and the community at large. We were particularly interested in how the public's perceptions of digital CI systems related to those of service providers and librarians. In addition to the sense-making propositions, we examined our qualitative data for such themes such as indicators of social capital, and analyzed our quantitative data for such patterns as the relationship between users' perceptions of how they were helped by the digital CI and their willingness to access it again for help in similar situations.

In the remainder of this article we share our findings regarding: (1) how the public is using networked CI systems for daily problem solving, (2) the types of barriers users encounter, and (3) how individuals and physical communities are befitting as a result of public library-community networking initiatives and the emergence of information communities (discussed later). Because our study employed a qualitative approach and was exploring a new phenomenon, our results are largely discussed in thematic terms (as opposed to a quantitative basis) with the intent of suggesting further areas for investigation.

## How the Public Is Using Networked CI Systems

The age of the 197 individuals who responded to our online survey followed a normal distribution with most respondents (71.4%) falling between the ages of 25 and 55, and slightly more women (54.6%) responded than men. Thus, our findings suggest that a typical user is nonexistent, socio-demographically speaking: users equally represent men and women, a distributed range of age groups, and a diverse range of occupations: from students to blue-collar workers to white-collar professionals. Moreover, study respondents included both first-time or novice users as well as very experienced Internet searchers.

Networked CI systems were used by our respondents for many different types of situations, including work-related and those of a personal nature. This confirms a tenet of information behavior, namely that all individuals require CI at one point or another and that it is the individual's situation that provides the greater insight into information seeking and use (Durrance, 1988; Harris & Dewdney, 1994). We found that users seek the following types of digital CI (in alphabetical order):

- (1) Business
- (2) Computer/technical
- (3) Education
- (4) Employment (sites, opportunities, requirements, forms, etc.)
- (5) Financial support
- (6) Governmental/civic
- (7) Health
- (8) Housing
- (9) Library operations and services

TABLE 1. Enabling characteristics of CI.

Enabling characteristic	Description of User's Goal
Comparing	Similar to verifying but may come earlier in the cognitive process
Connecting	How to find people with related interests
Describing	Services offered, cost, eligibility, etc.
Directing	Information about where something is located (e.g., how to get somewhere)
Explaining	In-depth, content-oriented information that explains how something works
Promoting	Want others to know about them (e.g., that they're available for employment, starting a new organization, etc.)
Relating	Information that is relevant to the individual's needs and situational constructs as perceived by the individual
Trusting	Information that individuals perceive as coming from a trusted source (i.e., CI that is accurate and current)
Verifying	A form of intelligence gathering (e.g., people want to keep up with what their competition is doing, be aware of new trends, etc.)

- (10) Local events
- (11) Local history and genealogy
- (12) Local information (local accommodations, community features)
- (13) Local news (weather, traffic, school closures)
- (14) Organizations and groups
- (15) Other people (both local and beyond the community)
- (16) Parenting
- (17) Recreation and hobbies
- (18) Sale, exchange, or donation of goods
- (19) Social services
- (20) Volunteerism

Examples of how respondents used the community networks included: (a) teenagers who sought summer employment information because they believed the community network contained all the local job information in one place and trusted it as a reliable, current source; (b) a man who found a local directory of gay and lesbian organizations on his community network after finding only national resources on the Web; (c) a home-bound person who used the network to research his family's genealogy because of its comprehensive organization of local resources, including public library, county agency and local historical association materials; and, (d) a woman who used the network for such local government information as current ordinances pertaining to trash pickup and flood damage prevention, and to identify sources of funding for a community service project intended to help a nearby low-income community.

The above CI categories expand upon those reported by Bisho, et al. (1999)—as discussed earlier—and are markedly broader than those traditionally used to classify CI needs. Chen and Hermon (1982, p. 47), for example, classified their data using seven categories (consumer issues, housing, education, recreation, health, personal relations, and other). Notable differences between our categories and those reported in pre-Internet CI studies are: (1) a strong emphasis on employment opportunities, volunteerism, social service availability, and local history and genealogy, and (2) the inclusion of such new categories as: sale, exchange and donation of goods, local news, computer and technical information, and other people (residing both within and beyond the community). We hypothesize that the

reason for this change in categories stems from an increased availability of the types and extent of community information due to the Internet.

According to sense-making theory, information needs cannot be considered in isolation of the situations in which they emerged, because any situation is likely to yield multiple information needs: information found for one aspect of a query frequently opens another, related information need. As we found, the situations for which users sought digital CI were complex and usually required multiple pieces of information. In this sense, our respondents described how their searches were ongoing and how they anticipated having to pose several different queries or consult multiple sources. This notion of the ongoing search is similar to Bates' (1989) "berrypicking" concept where users search for information "a bit at a time" and alter their search strategies according to what they find and what barriers they encounter.

In analyzing the CI that users sought by need category, we also focused on the information's enabling aspects, i.e., the attributes of the information that would aid users in whatever it was they were trying to accomplish. This approach builds on Dervin's notions of "verbings" and "helps," and her earlier work in which she identified seven needs of library users (for ideas and understandings, to contact a source, to reach a goal or decide which way to go, for rest and relaxation, for support and emotion control, to be connected and not alone, and for happiness and pleasure; Dervin & Clark, 1987, p. 24). As shown in Table 1, our analysis revealed nine information "enabling" characteristics for classifying the types of CI requested by citizens and nonprofit organization leadership. These enabling attributes provide an extended way of viewing information needs because they focus on what users are trying to accomplish for a particular situation and why they were helped by seeking a particular type of CI. When considered in conjunction with (a) the user's initial need, (b) the situation that prompted that need, and (c) what is known about the barriers that users encounter—as discussed next—these enabling categories reveal several implications for the design of digital CI systems.

## Barriers to Using CI Systems

Barriers, a key concept in the sense-making framework, represent the ways in which people are prevented or blocked from seeking information—or, more broadly, getting help—successfully. By identifying barriers, one can devise ways of improving the design of digital CI systems that facilitate users' information seeking. Our respondents were asked several open-ended questions that addressed types of barriers. Specifically, we asked them to explain what, if anything, would make it easier for them to find what they're looking for, and to describe any past actions they might have taken regarding their search topic. Despite respondents' confidence in their abilities to get higher quality information, they encountered a range of barriers to access along the way. As discussed in Pettigrew and Durrance (2001), our analysis revealed several basic types of barriers to using community networks and the Internet, in general. These barriers were: *technological* (e.g., slow connection speeds and software, unavailable or incompatible systems), *economic* (e.g., users could not afford computing equipment or online access), *geographic* (connectivity was unavailable or people lived far away from a public access site), *search skills* (users did not know how to search the system/Internet or how to use advanced methods), *cognitive* (users did not understand how the Internet works in terms of how links are created, who creates and manages the information, how sites are updated, etc.), and *psychological* (users expressed a lack of confidence in their own ability to find needed information, i.e., they internalized search failures and believed the reason they could not find something was because they were unable to carry out the search successfully).

In addition to these basic barrier types, the main barrier that we identified was *Information related*. It encompassed several subcategories:

- (1) *Poor Retrieval—Information Overload and Low Precision*: due to poor search engines and site indexing, users retrieved too much CI and were challenged with discerning what was relevant to their search;
- (2) *Poor Interface Design*: Users were often daunted by a site's layout (appeared too busy, too many bells and whistles, poor font and color choice, especially for those who are color-blind) and the amount of text displayed on a single screen;
- (3) *Poorly Organized (Classified)*: Users did not find CI where they expected to find it, and there was little crossreferencing;
- (4) *Out-of-Date and Inaccurate Information*: CI was either out of date or there was no way of discerning when a page was created or last updated. Inaccuracies in content were also noted;
- (5) *Authority*: without proper identifiers and author credentials or association endorsements, users found it difficult to gauge the quality of the CI source, i.e., whether they should trust the CI (and its source) or not;
- (6) *Missing*: users sometimes commented that information was missing, although it was described as existing at the beginning of a page or document;

- (7) *Dead Links*: Users were frustrated when finding a link to a page or site that they believe would be highly relevant to their information need, only to find that the link was inactive or otherwise unavailable;
- (8) *Language Used*: Beyond most information appearing in English only, some sites contained information written in jargon or at a level too high to understand;
- (9) *Security*: users want strong evidence that the information they submit and retrieve is confidential ("reassured security," as one user phrased it);
- (10) *Specificity*: users wanted to search for information at the neighborhood level and to find people;
- (11) *Nonanticipatory Systems*: users indicated that their information behavior would be greatly facilitated if CI systems were smart enough either to anticipate their next information need (based on the need posed to the system by typed query or by point and click) or a related information need. All too often users described how the site they found was not quite what they were looking for but they did not know where to go next.

In addition to the barriers noted earlier, these information-related barriers are highly significant because they represent specific impediments that users encounter when seeking information. Job seekers, for example, feel that they cannot get ahead unless they have access to a computer, not only so they can become more computer literate, but also because that's how they perceive that people learn about job opportunities these days. For any one situation or information need, a user might be confronted by several barriers, which, collectively, can overwhelm the user and prevent him or her from locating needed information.

These barriers point to problems as well as potential solutions for improving the usability and helpfulness of digital CI systems (discussed in Pettigrew & Durrance, 2001). Despite these information-related barriers, some respondents were highly confident that they could find what they needed through the community network. They tended to perceive their community network as a ubiquitous source and gateway to all knowledge. In this sense we identified a mismatch between what users think they can obtain via the Internet and the likelihood that that information exists and can be easily located. This finding expands on a principle of everyday information behavior: that a mismatch exists between what users believe service providers offer and what they actually do (Harris & Dewdney, 1994).

## The Public's Online Information Behavior: Social Connectedness

Beyond our basic findings as they relate to the sense-making framework, several themes emerged, as discussed in Pettigrew and Durrance (2001), that have specific implications for researchers and may aid in digital CI system design. Respondents, for example, indicated that they often tried other sources (e.g., friends, newspapers, telephone directories, etc.) for help with their questions before turning to the system. Such was the case of a Pittsburgh user, who

accessed the Three Rivers Free-Net after friends and co-workers told her that it contained job listings and other sources such as local newspapers had proven unsuccessful. Since the 1960s, information science research has indicated that social ties and face-to-face communication are primary sources of information, regardless of the setting (home, workplace, school, etc.). Contrary to the negative findings reported by Kraut et al. (1999) and Nie and Erbring (2000), our findings suggest that this remains the case: the Internet has not replaced the role of social ties in citizens' information behavior. During our interviews, several respondents described how they spoke about their information need or situation with a social tie before searching on-line. Thus, we found that the Internet is supplementing other information-seeking behaviors in addition to creating new pathways for obtaining information: the public is using digital CI systems as an additional source, which supports a key finding from pre-Internet studies (e.g., Chen & Herson, 1982; Savolainen, 1995): that people employ multiple sources based on such factors as accessibility and ease of use. Moreover, we learned that people *want* their community networks to promote social interaction by bringing people together. This notion was expressed by a user who said: "a bulletin board or some way to facilitate people meeting each other and getting around would be very helpful. I've recently moved to town and am looking for ways to meet people. Maybe a place where people could find others who are interested in a supper club or playing cards, or informal sporting groups, etc." This notion that users want the Internet to help them increase social ties and social capital is supported by Wellman, Haase, Witte, and Hampton (in press), who reported that communicating on-line is supplementing face-to-face and telephone communication, and that heavy Internet use is associated with increased participation in voluntary organizations and politics.

Further evidence that the Internet may foster social cohesion came from respondents, who revealed that they were searching for CI on behalf of another person (e.g., relative, friend), and not always at that person's behest. This notion of proxy searching, of gathering requested and unrequested CI for others, supports recent findings regarding the Web reported by Erdelez and Rioux (2000), which they describe as information encountering, and by Gross (in press), who describes how users present "imposed queries" at reference desks in public and school libraries. The Internet has made it easier for researchers to label and identify a particular social type, one that might be best described as "information gatherers" or "monitors" to borrow from Baker and Pettigrew (1999). In our study, these active CI seekers, who may be considered similar to information gatekeepers, relished time spent browsing and poking about the community network and the Internet. But their greatest satisfaction was when they found something that they believed might be of interest to someone else, which they would quickly pass on, either by e-mail or in person. Hence, a distinguishing feature of these CI gatherers is that they are socially connected or active, and, perhaps more importantly, are aware of the

potential CI needs or interests of people they know. These CI gatherers do not wait for someone to say "I need to know about X;" instead, they take mental notes of what's going on in the lives of the people around them, their interests and situations, and then keep an eye out for CI that might be of interest or helpful—not by initiating an actual, purposive search. In this sense, they are able to recognize the potential CI needs of the people around them and match it with available online information. Another defining element of this social type is that they do not really care if the CI they pass on is actually used, and they exhibit an understanding that sometimes information is used and proven helpful at a later point in time. This information gatherer social type has implications for systems design. In communities, for example, that are considered information poor, individuals who represent this social type could be identified and given advance training in Internet searching as well as in how to identify information needs and how to provide information in ways that best facilitate those needs.

We further found that respondents used the community network as a personal gateway to Web sites located throughout the world, while people far beyond the network's physical home were using it to obtain local information. A woman in Florida, for example, used the Three Rivers Free-Net to locate information about seniors' housing for her elderly father in the Pittsburgh area. A different user, who was accessing the network from another region, remarked on how it helped her connect with her family: "although I haven't lived there in years, I can keep up with the events and what is going on." Respondents also expressed interest in having a strong regional and neighborhood emphasis in their networks' content. These findings support Wellman's (in press; Hampton & Wellman, 2000) notion that the Internet has created "glocalization" where it is being used by individuals for both local and long-distance interaction.

### **How Networked CI Helps Individuals and Builds Community**

Despite the barriers that users encounter when seeking community information on-line, the participants in our study overwhelmingly emphasized how they have benefited from the availability of on-line CI via their community networks. Several themes emerged under this research question. Most notably, users reported an *increased ability to access community information* (Durrance & Pettigrew, 2001). Specifically, they described how they now have: (a) increased access to hard to get information; (b) increased access to "higher quality" information (i.e., more current, more comprehensive, better organized, and linked to other relevant sites); (c) information that is easier to use; (d) decreased transaction "costs" (saving them time, money, and energy; increased convenience); and, (e) increased ability to identify trusted information.

"I love the Free-Net and I'm incredibly satisfied with and grateful for the service." This user's comment reflected

those made by many others, who explained at length how they are benefiting from an increased ability to access information. A different user explained, "this information is not available in one spot anywhere else," and another said "good source of information with a broad basis. I recommend this site frequently, especially to those considering relocating to the area." A user accessing the system from home commented on how it provides "one easy location to hook up to the local and state government agencies." Another user remarked: "I absolutely rely on this Web site for home and work projects. I also refer lots of people I speak with (I'm a recruiter for the City) from out of state and locally to the Web site. It cuts through all the garbage and gets straight to the heart!" A woman accessing the system from work said "I use this page as my home page because it offers concise and effective access to all areas of the Net, all organized in an understandable way. Best of all, since it is non-commercial, I feel that I'm being directed to the best sites, not just the sites that have paid for a listing."

Users also described how access to networked community information yielded *benefits at the personal, family, and neighborhood levels*. Specifically, they described how community networks have provided them with: (a) greater confidentiality protection and greater comfort in asking sensitive questions; (b) greater skill and confidence building; (c) employment and educational gains; (d) increased knowledge of community; and, (e) value for family, friends, and neighborhood.

Support for these themes emerged repeatedly. People explained how their local community network provided them with one-stop shopping for information about all aspects of their area and met the information needs of their entire families. One user commented on how relocating to the city was made easier by the network. He said: "I'm very glad the network is available here. It's made moving to the city much easier to deal with. I can still get in touch with friends via e-mail, look for information and products, and generally not suffer the pangs of complete withdrawal from the TI access I had before moving here."

Both users and other stakeholders, including social service and public library staff, reported benefiting from the ways in which public library–community network initiatives build community and facilitate cohesiveness both within and among different subpopulations. Specifically, they explained how: (a) bridges are being built and social interaction is increasing among people of different ages and previously unconnected people and groups; (b) linkages, connections, and partnership opportunities are increasing; (c) communication among organizations is increasing; (d) more information about the community is being shared; (e) trust is increasing among organizations; and, (f) the limits of geography are being reduced.

Leaders of community nonprofit organizations, specifically, elucidated upon how they have received the following benefits as a result of participating in their local community network: (a) more effective at service provision; (b) enhanced visibility—word gets out to more folks, wider au-

dience, additional, volunteers and support; (c) more tuned into the Internet and its benefits; (d) knowledge/skill and confidence building; (e) information technology helps them better serve community; and, (f) decreased transaction costs.

### Sense-Making Revisited

We used Dervin's (Dervin & Frenette, 2000, p. 74) model of the sense-making methodology to map our findings regarding users' on-line information behavior. As explained earlier, sense-making contains several main concepts: the user's situation that creates his/her needs for information (or gaps), the barriers that the user encounters in expressing those needs and while seeking information, and the results or "helps" that the user obtained through the course of successfully information seeking. In our study, as shown in Figure 2, community network users go online seeking CI needed for varied situations, such as planning a large family reunion, which was the case for Grandmother Carruthers. She was seeking several types of CI through the community network: from hotels and transportation to potential venues and activities for family members of different ages. Her situation thus encompassed multiple CI needs, each one requiring different enabling characteristics. For hotels, for example, she wanted CI that was both describing and directing in nature. For venues she additionally sought CI that she could consider as "trusting."

But as further modeled in our diagram and consistent with the sense-making framework, in searching for CI users encounter several types of barriers. Mrs. Carruthers, for example, was challenged by information overload and missing information. Other barriers included geographic, because she lived out of state, and search skills, as she was not experienced with searching the Internet. Yet, as further shown in Figure 2, by dealing with each type of barrier encountered, users progress towards obtaining the CI needed to resolve their situations. Mrs. Carruthers reported that she was finding the CI that she needed, piece by piece, and that her situation or family reunion planning objective was coming together. Due to the availability of CI she had better access to hard to get information and experienced decreased transaction costs along with an increased knowledge of the community while improving her searching skills thus gaining greater confidence.

### The Emergence of Information Communities

Collectively, our analysis of users' information behavior and the benefits accrued by users and other stakeholders suggests that on-line community networks are transforming physical communities into information communities. In other words, the Internet has facilitated the creation of information communities—an emerging concept that describes constituencies united by a common interest in building and increasing access to a set of dynamic, linked, and varying information resources. Common foundations and

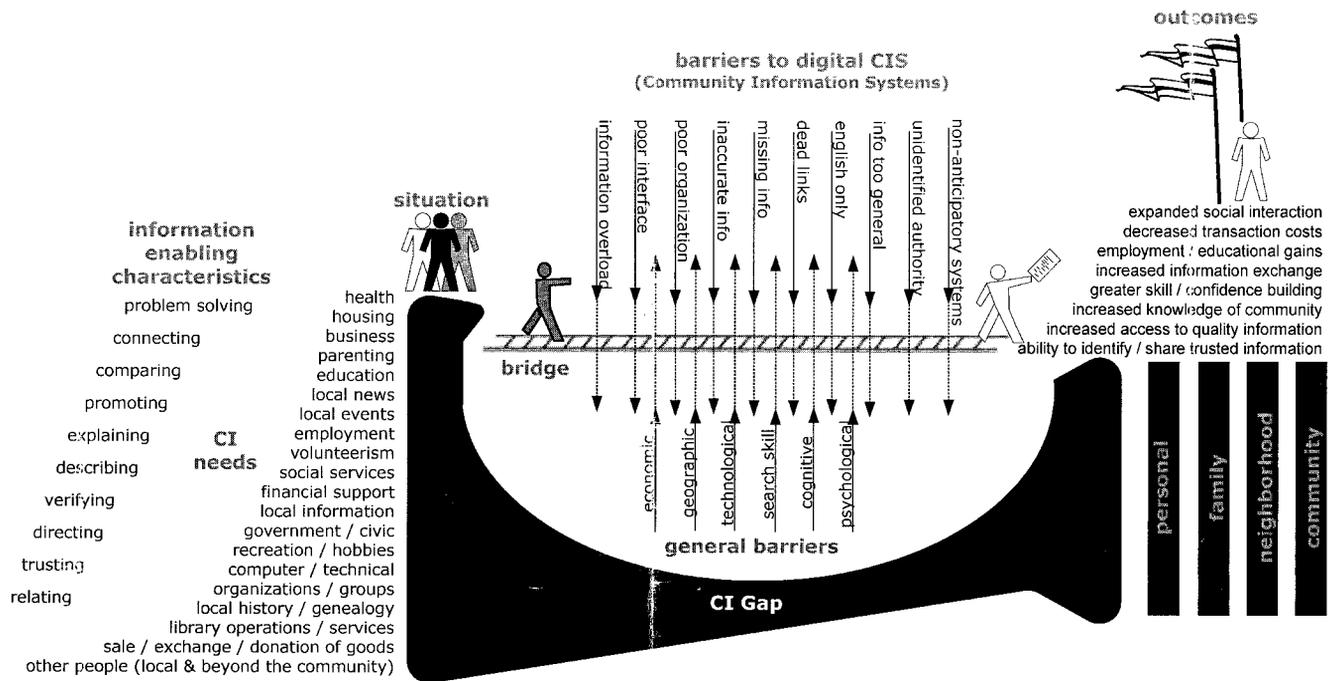


FIG. 2. Mapping our findings according to Dervin's sense-making metaphor.

shared principles offset the uniqueness of different information communities. They are, for example, likely to be dynamic and distributed (in technological terms), and involve the collaboration of a variety of organizations that may share joint responsibility and resources (including in-kind contributions). Moreover, information communities form around people's needs to get and use information—concepts of which their leaders have some understanding. Because these communities effectively exploit the information-sharing qualities of the Internet, they tend to incorporate diverse information providers, use collaborative approaches, communicate across geographic and other barriers, and adopt entrepreneurial approaches. Although some information communities are based on geographic boundaries, others are based on thematic interests. This concept of information communities along with in-depth examples is being addressed in future reports (Durrance, 2001; Pettigrew, Durrance & Unruh, submitted).

## Conclusion

Our study of users' on-line information behavior reveals a rich portrait of how individuals now have faster access to more detailed information in ways that were never possible, even a decade ago due to digital CI system initiatives. Undoubtedly, the Internet is responsible for the strong emphasis on employment opportunities, health information, and other traditional CI as well as the emergence of new CI categories. As our study revealed, increased computer capabilities and on-line connectivity have enabled many different types of service providers to make information available about themselves that was previously unavailable or

quite limited. In other words, service providers are now able to share information about themselves first hand. Prior to the Internet, such information was largely available on paper and only searchable by intermediaries (although many public libraries maintained electronic, in-house databases, these databases were seldom available to the public for direct end-user searching). The breadth of CI available, along with new search engine and software capabilities, has contributed to extending the notion of what CI encompasses. Just as the Internet is broadening the concept of community, so it is changing the scope of CI. Digital CI systems enable people to search for other people on-line, sell and trade goods, research their family histories, exchange neighborhood information—all at a faster, more immediate pace. Increased access to the Internet, and hence CI, especially that which has been brought together by community networks and public libraries has led to an increased public awareness of what's available, what's going on, and what might be found in a community. This enhanced access is undoubtedly facilitating CI flow. Whereas people once relied on conversations over backyard fences, postings on notice boards at supermarkets, and local newspapers, they are now drawing upon the capabilities of the Internet to seek and share information about their communities. We found that public librarians are key players in increasing this CI flow.

These networked CI systems are valued and used by the adult population, and enable individuals, from near and far, to find information about local services and events, and facilitate different types of information seeking for everyday living. Our analysis of the situations that create users' needs for CI revealed a plethora of findings that expand on

previous reports, and signify several ways in which people are seeking CI at the turn of the century by drawing upon new technologies supported by public libraries. However, our results also indicated that users' mental models of what information exists, is retrievable, and is accurate on the Internet are overly optimistic. Although many barriers are associated with digital CI system access, these same barriers suggest optimal solutions that may assist in creating even stronger and more information literate communities. Our findings further reveal that on-line community networks strengthen physical communities in multiple ways and that they may be considered as catalysts for increasing social capital, a theoretical perspective that we are using to examine our data along with how public libraries are benefiting—as institutions—from community networking. Also, our findings support the notion that “information communities” are emerging, and are identifiable using empirically supported criteria that may apply to other settings.

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