The Promise of the Internet for Disability: A Study of On-line Services and Web Site Accessibility at Centers for Independent Living

Heather Ritchie, M.S.W., and Peter Blanck, Ph.D., J.D.*

The Internet provides individuals with disabilities numerous tools to live independently. In the convenience of the home, a person can access an abundance of information, an electronic community, updates on the latest disability advocacy news, education through distance-learning classes, and on-line shopping for books, clothes, assistive technology, and a host of other consumer goods. Centers for Independent Living (CILs) are consumer-run, non-profit grassroots disability service organizations at the forefront of the disability rights movement. Providing services to individuals across the range of disabilities, CILs have begun to use the Internet as a complement to their traditional service delivery methods. This article examines the emerging trend of independent living services on the web. The investigation examines 200 CIL

Internet sites across the United States during the period of April to August 2001. Information is collected and analyzed about how CILs are using the Internet to provide their services and programs. In addition, the article examines the technological accessibility of their web sites. Implications of the findings for CILs, consumers with disabilities, and disability policy are examined. Copyright # 2003 John Wiley & Sons, Ltd.

INTRODUCTION

Centers for Independent Living (CILs) are non-proft, non-residential, community-based organizations directed by persons with disabilities. As required by the Rehabilitation Act of 1973, the majority of board members and employed staff at CILs are individuals with disabilities (Kailes & Hughey, 1999). CILs provide cross-disability services and programs; their core services address environmental and attitudinal barriers encountered by persons with disabilities as their consumers.

Peer-role modeling and consumer control over services differentiate CILs from other providers of services. Their unique model of service is based on the principles of the independent living (IL) philosophy, emphasizing self-determination and the belief that individuals with disabilities are in the best position to assist other persons with disabilities to live independently (Minnesota Association of Centers for Independent Living (MACIL), 2002).

The promise of the Internet for individuals with disabilities is its abundance of resources that assist with independent living. Without leaving home, an individual can access informational resources, participate in a global electronic community, locate accessible transportation routes, fnd a job, catch up on the latest disability advocacy news, or shop on-line for consumer goods such as books, clothes, or assistive technology (e.g., mobility devices and accessible vehicles). Access to resources on the Internet typically is direct and may be performed without the assistance of an intermediary. For example, a woman who uses a mobility device does not have to explain her need for widened doorways to a realtor if she instead may fnd an accessible housing guide on the Internet. This direct access complements the CIL philosophy of consumer control over services, the rejection of reliance on professionals, and the advancement of consumer self-direction.

The promise of the Internet for CILs is its ability to act as a medium for delivery of meaningful timely services. Its use for consumer services is consistent with the IL philosophy of empowerment and informed choice; web sites become a tool for mobilizing consumers, providing IL resources, establishing peer relationships, and providing education and outreach to the community about disability issues.

This article provides the frst descriptive portrait of how CILs across the United States are engaged in the provision of independent living services on the web. The investigation examines 200 CIL Internet sites during the period of April to August 2001. Information is presented on the ways in which CILs provide core services and aspects of their programs, as well as the technological accessibility of their web sites.

The next part of this article provides background information on CILs and computer usage by consumers. The method of study and the fndings of the investigation are presented in subsequent sections. The implications of the fndings for CILs, consumers with disabilities, and disability policy are examined in the fnal part.

CILs AND THE INTERNET

Independent Living Services at CILs

Originating in Berkeley, California, in the 1970s, CILs are a national network of grassroots organizations. Currently, there are 368 main CIL offces with an additional 207 satellite offces in the U.S. and its territories; they are located in every state, and in urban and rural areas (Buckland, 2002).

The primary mission of CILs is to assist and empower individuals with disabilities through services and programs that refect the IL philosophy. IL philosophy does not mean self-suffciency as reliance only on oneself. Instead, it refers to the rights of persons with disabilities to self-determination; that is, to control their lives (MACIL, 2002). This includes civil rights, entitlements, and consumer control over services as well as the right to fully participate in the community. Full inclusion in the community requires the absence of environmental and attitudinal barriers that restrict, for example, employment opportunities, public right of ways, assistance with daily living tasks, housing options, and the use of public transportation. CIL services stress role modeling, peer relationships, access to resources for independent living, and teaching consumer skills such as problem-solving, leadership, self-advocacy, and organizing for social change.

Infuenced by various social and civil rights movements, CILs emerged initially as self-help groups that became a service model, a social movement, and a new paradigm of disability (DeJong, 1979). Prior to the IL movement, the dominant paradigm of disability was the medical model. This medical model placed individuals with disabilities in a passive role dependent, typically, on professionals and family members, who frequently considered the ''disabled'' person as unable to control his or her own life (Blanck, 2001; Blanck & Millender, 2000; DeJong, 1979). Likewise, the medical model viewed disability as located at the individual level, and hence, it was the individual who needed to be ''fxed,'' rehabilitated, or cured.

In contrast, the IL movement and CILs, which are the movement's centerpiece, redefned disability as an interaction between the individual and the environment. The IL model of disability stresses the physical and attitudinal barriers that impact the individual's experience of disability. Physical barriers include the lack of curb cuts, tactile signage, and interpreters as well as inaccessible housing, transportation, and recreational facilities. Attitudinal barriers include patronizing attitudes and discriminatory beliefs that view persons with disabilities as less competent (Blanck & Millender, 2000).

The IL movement led to a dramatic paradigm shift of disability that has informed ''the thinking of disability professionals and researchers, has spawned new service-delivery models, and has encouraged new research directions'' (DeJong, 1979, p. 435). CILs are instrumental in developing and advocating for this new paradigm

of disability and consumer-directed services. Likewise, CILs are a vital part of the disability rights movement.

Since 1978, CILs have received federal funding from Title VII of the Rehabilitation Act of 1973 (as amended in 1998) and are overseen by the Rehabilitation Services Administration (RSA) in the U.S. Department of Education. Approximately 75% of CILs receive Title VII funds (Buckland, 2002). The current federal funding formula for new centers is based on each state's population growth. Operating budgets range from $55,000 to 538,000 (Seekins, Innes, & Enders, 1998). This range in operating budgets refects, in part, variations in the availability and level of state funding. Including money from all funding sources, a typical CIL has a modest budget of approximately $200,000 and serves multiple counties (Seekins et al., 1998).

Consumers and Computer-Mediated Communication

Computer-mediated communication refers to methods of electronic communication such as email, bulletin boards, chat rooms, and instant messaging. Computer-mediated communication may be sent through a publicly available network-based application such as Usenet discussion forums or may instead be sent on private services such as subscription-based chat rooms or bulletin boards.

Individuals with disabilities quickly adopted computer-mediated forms of communication to conduct advocacy, access information, and participate in peer support (Fullmer & Walls, 1994). Studies show that participants with disabilities are enthusiastic users of e-mail, bulletin boards, and Internet support groups, reporting various benefts from their use.

Computer-mediated networking provides a means of obtaining emotional support for individuals with disabilities (Boberg et al., 1995; Hagins, 1995; Sharf, 1997; Zinn, Simon, & Orme, 1997), with benefts such as information sharing, peer support, convenience, anonymity, and opportunity to converse with others (e.g., Finn, 1999). Individuals with disabilities indicate this technology enhances decision-making capability through access to information on the Internet and from peers (Waldron, Lavitt, & Kelley, 2000).

One study that followed a computer distribution and network project for individuals with disabilities found that participants were empowered through communicating electronically with peers and service providers, becoming more involved in their service delivery. The project was so successful that consumers were ''apologizing because they felt they had used the [network] too much'' (Schoech, Cavalier, & Hoover, 1993, p. 37).

Research suggests that computer-mediated communication may be as effective as face-to-face communication (Weinberg, 1996). Individuals seek out similar support whether online or in person. Winzelberg (1997) found that participants of an electronic support group for individuals with eating disorders used helping skills similar to those in face-to-face support groups. In an investigation of Internet health information quality on incontinence, Sandvik (1999) indicated that lay people ''provided comprehensive information'' about techniques and adaptive needs for this health issue (p. 31).

The limited literature on computer-mediated services in vocational rehabilitation suggests that the Internet is a promising medium for rehabilitation services. Many counselors view it as a viable method of service provision (Riemer-Reiss, 2000). Patterson (2002) found rehabilitation counselors expressed increased job satisfaction from using computer-mediated communication within their agency, and 65% of the 1,034 counselor respondents to the survey indicated that they communicated with consumers by email. Consumer use of the Internet in the rehabilitation process allows access to agency information and services, medical information, assessment tools, labor market information, job searches, and other features (Sarno & O'Brien, 2000). Likewise, human service providers approve of the use of information technology in their work and, among other benefts, view it as a valuable tool in client education (Hughes, Joo, Zentall, & Ulishney, 1999).

There are disadvantages to computer-mediated communication including inappropriate disclosure of personal information (Weinberg, 1996), ignoring the crisis of users who need professional assistance, and the potential of dependence on this time-consuming medium for emotional support (Waldron, Lavitt, & Kelley, 2000). Individuals also may be disempowered if they receive inappropriate messages (Burrows, Nettleton, Pleace, Loader, & Muncer, 2000), are unable to access technical assistance when the technology fails (Waldron et al., 2000), or if there are signifcant time lapses between communications during the use of electronic bulletin boards or email (Boberg et al., 1995; for a review of potential benefts and problems associated with computer-mediated communication, see Sampson, Kolodinsky, & Greeno, 1997).

One of the basic problems for individuals with disabilities who want to join the electronic community is access to computers, modems, Internet service providers, and assistive technology (Cameron, Graham, & Sieppert, 2000). Although adults with disabilities are more likely than adults without disabilities to express that the Internet has improved their quality of life (Taylor, 2000), they also are less likely to be online. Using data from the December 1998 Current Population Survey, Kaye (2000) found that only 10% of people with disabilities use the Internet compared with almost 40% of those without disabilities.

This difference, in part, may be due to a lack of adequate resources for assistive technology and, as importantly, training and technical assistance for assistive software and devices (Berven & Blanck, 2000; Hagins, 1995; Schoech et al., 1993). Technological advancements have produced a range of assistive technology that allows individuals with disabilities access to electronic information through the use of alternatives to the standard keyboard, mouse, and screen (Blanck, Schur, Kruse, Schwochau, & Song, 2003).

One example is refreshable Braille, an electronic device that translates the text on a computer screen into a Braille output device. Similar to other technology, assistive technology may break down or confict with other software and devices on a machine. If the user lacks the fnancial resources to repair the device or access specialized technical assistance, he will become electronically stranded. At times, users abandon assistive technology due to the frustration and diffculty of accessing technological support.

Although the promise of the Internet holds the potential for access to an expansive information database and an electronic community, the lack of accessibility features on web sites presents a fundamental obstacle to Internet usage for

some individuals with disabilities. Research indicates that people with disabilities encounter numerous accessibility barriers on the Internet, making activities such as purchasing products or fnding specifc information time consuming or diffcult (Center for an Accessible Society, 2001; Neilson Norman Group Report, 2001). The inaccessible aspects of web sites prevent many individuals from effectively and effciently using a web page.

Inaccessibility includes the lack of an alternative text-based narrative that describes graphic images on the screen or poor design of a web site that makes navigation diffcult. Alternative text descriptions (' 'ALT tags' ') refer to narrative information on the site that explains the content of the image. Without an ALT tag, a user with a text-based browser or a screen reader will know that there is an image, but will not have information about the content of the image (Konop, 2002).

Images often are on web sites to convey content and, as importantly, to navigate the site. ALT tags are essential components to some features, particularly when the site does not provide another text-based method to access the information (such as a text-only version or text-based links). Likewise, frames separate the web site into compartments. When a design incorporates a frame without a proper label, a person using a text-based browser or screen reader cannot determine how to navigate the site (Konop, 2002) (for a further discussion of web site accessibility, see Klein et al., 2003).

Web site accessibility may be thought of as the curb cuts and ramps of cyber-space. Individuals with disabilities ranging from vision impairment to limited fne-motor skills to cognitive diffculties rely on these ' 'cyber ramps' ' to access web-based information and to navigate web sites. Without these features, many persons with disabilities are unable to use the site. However, accessibility features also beneft other users (Blanck & Sandler, 2000). They provide easier navigation, quicker download times for slower modems, and greater ease in fnding content material of the web site (Arch & Letourneau, 2002).

With the rapidly increasing use of electronic resources and communication in public life, knowledge of computers has become an independent living skill (Conklin, 2001). Responding to this need, CILs have established computer labs with training for consumers; a few provide computer recycling programs, requesting computer donations from the community that are refurbished for persons with disabilities (for example see Brown, 1999).

The goal of the present investigation is to provide new and descriptive information on how CILs provide access to independent living services, peer connections, and disability advocacy over the Internet.

METHOD OF INVESTIGATION

Identification and Collection of CILs' Web Site Data

The present study systematically reviewed the web sites of 200 CILs during the time period from April to August 2001. Web sites were identifed using the *Directory of Independent Living Centers and related organizations* (Richards, Nosek, & Zhu, 2000) published annually by Independent Living Research Utilization (ILRU) (see Blanck, Ritchie, Schmeling, & Klein, 2003). The initial list of 155 CIL web sites

was supplemented with an additional 58 web sites identifed from online searches on Google and Alta Vista using the organizational name of each CIL. Satellite offces were eliminated to ensure non-duplication of web sites in the study. During the four months when the study was conducted, 13 web sites went off line without reappearing.

The array of web pages contained in each web site was saved in an electronic format. Although the web pages were saved as they were being coded, a small amount of coded material is different from the saved information due to daily changes that occurred on the web sites. This problem, though small in scope, is one limitation of this study type and modestly defeated the estimates of inter-rater agreement discussed below. Limitations in using archival web sites for coding meant that coding was conducted while viewing the web site on line. The main disadvantage of using archival material to code was that certain aspects—such as graphics—did not always maintain their integrity in the saved format. Despite this caveat, the purpose is to provide an overview of disability service features and the accessibility of the web sites.

The dynamic nature of web pages also meant that web sites disappeared regularly. Web sites either permanently vanished, or, due to problems with the server or web site host, the web site would display an error message. To address this issue, the coders periodically revisited URL addresses throughout the study to check whether the web site had been restored. In cases where the web site was coded but disappeared before the information was saved, the site was not included in the study. Other sites not included had a majority of pages that were under construction and appeared to be URL placeholders. Overall, the web sites evaluated in this study displayed a majority of functioning web pages; that is, the web site remained on-line during the course of the study and only had one or two areas under construction.

Coding Web Site Categories

The web sites identifed were coded for on-line services and for technological accessibility. The coding categories were developed and refned by structured pilot coding of 40 (20%) of the 200 web sites by a group of professional and graduate students with and without disabilities.

Coding Social Service Categories

Coding categories were developed based on services and programs with an emphasis on the CILs' core services. The category of advocacy was separated into the two areas of self-advocacy and systemic (Centers for Independent Living: Final Rule. Subpart G— Evaluation standards and compliance indicators, 1995). The categories were defned in a manner similar to the service defnitions in the RSA annual performance report for CILs (RSA, 1999) with an emphasis on instructive materials and methods allowing interaction between staff and consumers over the Internet. Specifcally, the categories are defned as follows.

(i) *Peer counseling* involves problem solving, peer support, teaching, and the sharing of information among individuals with similar or differing

disabilities (RSA, 1999). This differs from psychological or professional counseling, in part, by emphasizing the establishment of peer relationships (RSA, 1999). The coding scheme included three types of *peer counseling* over the web: a peer bulletin board, a peer chat room, or an email address on the web sites that was specifc to a peer counselor. The chat room could be moderated by a staff member or unmoderated. Bulletin boards allow users to type messages for others to read and supply a response. Chat rooms provide for real-time interactive text communication.

(ii) *Self-advocacy* involves assisting a consumer to access services and benefts (RSA, 1999). It included instructive material on a web site on subjects such as disability rights or successful self-advocacy.

(iii) *Systemic advocacy* refers to activities that positively change policy to make ''facilities, services, and opportunities available and accessible'' to consumers (RSA, 1999, p. 19). Examples include legislative updates, advocacy alerts, listservs that allow for receipt of electronic legislative information, and information on lobbying activities.

(iv) *Independent living skills* enable a person with a disability to acquire the skills necessary to live more independently (RSA, 1999). This category was defned as instructive materials on the site that would assist a consumer in living independently. Independent living skills on a site included materials on how to manage a personal assistant, develop an independent living plan, and fnd a job.

(v) *Information and referral* was limited to links on a site that direct the user to other disability services or community web sites and directories of information on the site, such as on housing or assistive technology.

In addition to these services, other aspects of CIL programs were included in the coding scheme. The category *newsletter* included newsletters or a calendar of events posted on the site. *Program explanation* included information on the services and programs or the peer-based mission of the organization. A simple listing on a web site of the core services was not deemed suffcient to indicate that the web site explained the program. Another category included the posting of *CIL job opportunities* or a community *job bank* on the site (CIL jobs and job bank).

The research team also gathered data on the use of forms and the provision of an email address. The use of *forms* was documented for the three purposes of *services*, *donations*, and *volunteer recruitment*. The defnition allowed the forms to be structured with predetermined felds for the consumers to fll out as well as unstructured leaving free space for the user to type in concerns, questions, or information (Neu, Anderson, & Bikson, 1999).

The provision of an *email address* on the web site or an email dialogue box that appeared after clicking on a link (e.g. an ''email us'' icon) was coded with three separate categories: *general email*, *staff specific*, and *executive director*. ''Email refers to messages sent through the Internet'' that allow for unstructured ''free-form electronic correspondence'' and involve an email destination address (Neu et al., 1999, p. 2). Because the use of email and forms involves interaction between staff and community members, the inclusion of these items was considered as further evidence of the organization's efforts to conduct services over the web. The use of *e-commerce* or the selling of a product over the Internet as a method of fundraising also was coded.

Coding Accessibility Categories

The accessibility assessment was limited to the home page of each web site, that being the frst page a user would access when going to the organization's URL address. For some sites, the URL address took the user to an initial page and then directed the user to a second page that provided the main navigational features for the sites. We confned the study to the initial page, however, viewing the organization's URL address as similar to the doorway of a physical structure. The interior of a web site may be accessible, but if the entrance contains barriers, many individuals with disabilities will be unable to enter (cf. Klein et al., 2003, this issue).

To assess web site accessibility, we developed a ten-point list of accessibility features based on aspects of the World Wide Web Consortium (W3C) Web Accessibility Initiative (W3C, 1999b) guidelines. Our modifcations of the W3C guidelines allowed us to code the sites by features as they would appear to a user of the web page. We did not review the underlying computer code for the web sites.

The ten-point accessibility features assessment includes the following.

  (i) The site did not use frames that separated the screen into divided compartments.
 (ii) All graphic images on the site had text-based descriptions for the images. (These text-based descriptions, also known as ALT tags, appear to a sighted user in a box or tag next to the image when the cursor is placed over the image.)
(iii) The site did not have content material embedded in a graphic image. (For example, an image may include a graphic or picture as well as text. If the text is embedded in the image, it will not be accessible to individuals who use a text-based method to read the web.)
 (iv) The site had a map or table of contents.
  (v) The site provided high color contrast against the background.
 (vi) Links that used images could be understood without the image. (For example, avoiding the use of links such as ''click on red circle.'')
(vii) The site had redundant text-based links for image maps on the site. (Image maps are graphics comprised of linkable regions (hot spots) that the user can click on and produce an action such as going to another place on the site (Konop, 2002).)
(viii) The site had adequate space between hot spot buttons and text-based links.
 (ix) There was a text-only version of the site as an alternative to the graphic version.
  (x) There were no fashing items, pop-up windows, or scrolling text.

The list of accessibility features is not exhaustive and represents the primary usage barriers encountered by individuals with various types of disability. Many of the features assessed are relevant to individuals who use screen readers and text-only browsers to navigate and read the contents of a web site (items (i) – (v) and (ix)). Other items ((i), (iv) and (x)) assist an individual with a cognitive disability such as dyslexia to concentrate on the content. Adequate space between hot spot buttons and text-based links help an individual who cannot use, with accuracy, a mouse to click on a link (item (viii)). High color contrast is useful for individuals who have low vision or color blindness (W3C, 2000). Text equivalent links for interactive image maps accommodate the usage of alternatives (e.g., a keyboard) to a pointing device (W3C, 1999b).

The quality of ALT tag descriptions of graphics was coded individually. Adequate description indicates that the tag did not include (i) an empty ALT tag, (ii) an ALT tag that just provided the name of the graphic fle (e.g. ' 'xxx.gif' '), or (iii) an ALT tag that described something different than the graphic to which it was attached. For an ALT tag to be defned as having an adequate description, the site could not have any of these ALT tag problems.

Web site home pages also were evaluated by generating an accessibility report using the utility program Bobby Worldwide (Version 3.2). Created by the Center for Applied Special Technology (CAST) as a tool for web page developers, Bobby is available on the Internet (http://bobby.watchfre.com/bobby/html/en/) and is based on the Web Content Accessibility Guidelines of the W3C. The program performs an assessment of the accessibility problems or ' 'errors' ' for a web page or site and provides a report. The report indicates the location of errors and the number and type of errors, and includes links to information regarding how a web developer can correct the errors (Schmetzke, 2001).

The Bobby report is structured based on a three-tier scheme of accessibility priorities. Using Schmetzke's (2001) protocol, our assessment using the Bobby program was limited to Priority 1 errors automatically checked by the program. These are barriers ' 'that seriously affect the page's usability by people with disabilities' ' (CAST, 2002). For example, items such as lack of text-based descriptions for graphic images, improperly labeled frames, and reliance on color to convey content fall under Priority 1 type errors (for a listing of accessibility priorities, see W3C, 1999a). At the time of the study, the program version of Bobby (Version 3.2) indicated that the site qualifed for ' 'Bobby approval' ' if the web site met Priority 1 standards.

Certain features discussed in the Bobby report require manual checking. For example, color contrast cannot be assessed by the program. Other aspects of site accessibility may not be in an appropriate form. A site that has text-based descriptions of all graphics will pass Bobby if there are no other types of error; however, the quality of the ALT tag descriptions may be poor. The ten-point accessibility checklist used in this study required a manual check and provided further information on some accessibility features left undetected by the Bobby utility program.

Despite limitations, the Bobby program provides a valuable accessibility check of a web site (Schmetzke, 2001). Web site developers use the Bobby accessibility report to evaluate their sites and indicate their use of its accessibility standards by displaying the Bobby icon (a British police offcer) on their web site.

Inter-Rater Reliability

Inter-rater reliability was assessed for the 21 disability service categories and the 10 accessibility features on a random sample of 25% (50) of the web sites. Overall inter-rater reliability for the two coders for the service categories was high at 92% agreement (calculated by agreement of categories divided by possible agreement multiplied by one hundred). Inter-rater reliability for the disability service categories ranged in agreement from 76% (peer counseling) to 98% (peer counseling chat room, systemic advocacy, donation forms, CIL job opportunities, and

e-commerce). Inter-rater reliability for the accessibility features was 88.3%, with a range of 57 (text link alternatives for image maps) to 98% (text-only version). Even more subjective categories of the accessibility features, such as high contrast and adequate space, evidenced high inter-rater reliability, 92 and 94% respectively.

RESULTS

Overview of Web Sites

Approximately 60% ($n = 126$) of the CILs on line had organizational web sites that included an email address and informational links among other services and aspects of the CIL program. Results of the full range of core services appear in Figure 1.

Information and Referral

Information and referral was the most frequently occurring core service on CIL web sites, with three-quarters (75.5%, $n = 151$) of sites providing links and directories on disability-related community features. Examples of community accessibility material on the web sites included a guide to accessible theatres in the community (Washington Coalition of Citizens with disAbilities in Washington state), a restaurant accessibility guide in printable format (Springfeld CIL in Illinois), and a guide to local accessible recreation (Independence*FIRST* in Wisconsin). Paraquad in St. Louis, Missouri, provided an accessible housing clearinghouse on their site that allowed users to search the directory by location and availability of the dwelling. For each apartment, the database included measurements of the rooms as well as pictures. Options for IL in Wisconsin took visitors on a virtual tour of a universal-design house.

Other sites provided databases of disability resources. Endependence Center of Northern Virginia had extensive information on various disability topics such as adaptive clothing and a travelers' guide to the area including information on accessible hotels and renting accessible vans. Several sites had a classifed advertisement section for individuals to fnd used assistive devices such as wheelchairs or accessible vans.

Advocacy

The second most frequent provision of the core services over the Internet illustrated in Figure 1 was advocacy. Sixty-fve of the sites (32.5%) provided advocacy on sites, with a higher frequency in systemic advocacy (29.5%, $n = 59$) compared with self-advocacy (17%, $n = 34$). Of the 200 sites, 37 sites (18.5%) provided self- and systemic advocacy information.

Innovative examples of advocacy included the provision of forms for the user to submit an ADA accessibility complaint to the CIL. A staff member would then investigate the complaint on behalf of the consumer (Catskill CIL in New York). Self-advocacy included teaching material on the steps an individual could take to fle
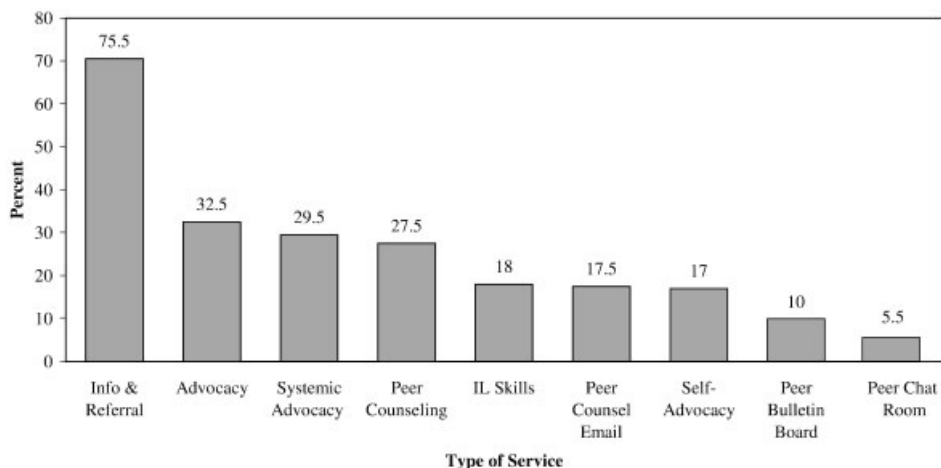
Figure 1. Core services on CIL web sites.

a Title III ADA accessibility complaint (Liberty Resources in Pennsylvania). There were sites providing information on how to protect oneself against theft and abuse by others (New Horizons ILC in Louisiana and Westchester CIL in New York, respectively). Sites allowed users to subscribe to legislative action alerts through email or by joining a listserv. Marin CIL in California had information on how to conduct a background check prior to hiring a personal assistant. Other CILs were posting the minutes of local consumer meetings on disability issues.

Peer Counseling

Peer counseling was the next most frequently seen service on the web sites (27.5%, $n_{1/4}$55). Hawaii Centers for Independent Living had an extensive message board that allowed consumers to post messages on disability issues and bulletin boards, and to purchase or sell items like computers, household appliances, vans, and wheelchairs. Ten sites (5.5%) had chat rooms. Access North in Minnesota hosted peer support groups, an Internet pen pals connection, and provided e-therapy with licensed therapists using e-mail, or interactive chat, or videocam/videophone sessions.

Independent Living Skills

There were 36 web sites (18%) providing independent living skills. Examples included a downloadable document on how to build a ramp (Minnesota's Access North) and a printable application package for consumers to access that state's telecommunication equipment device program (Vermont CIL and FREEDOM Resource CIL in Minnesota). Other sites featured independent living self-assessments and assistive device identifcation worksheets.

Numerous sites had information on personal assistant services (PAS) that included features such as PA management manuals (fnding, hiring, and managing a PA) as well as material on how to access the program. The Center for Independent
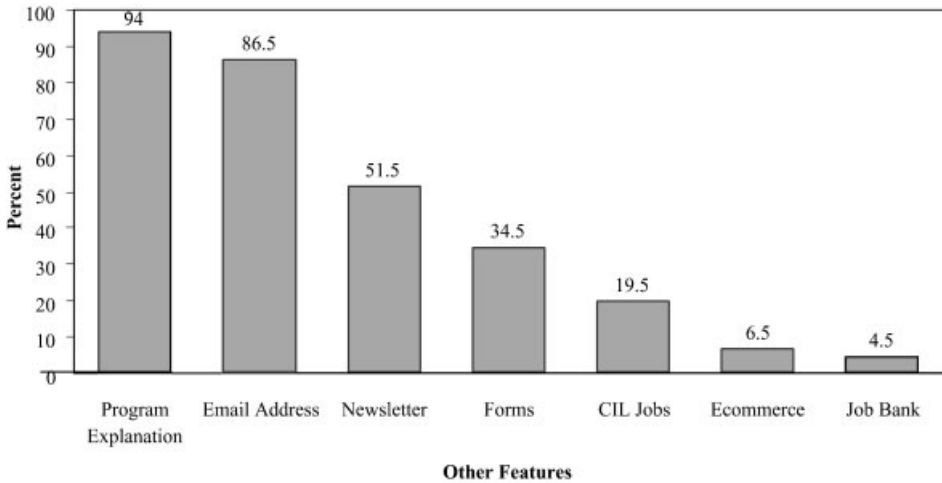
Figure 2. Additional features on CIL web sites.

Living in Berkeley, California, had printable handbills on their site that a consumer could use to advertise for a personal assistant (PA). The Berkeley CIL and Placer Independent Resource Services in California had an application that could be submitted over the web for individuals interested in becoming PAs.

Non-Core Services of CIL Programs

Additional features revealed during the research included a variety of the non-core services on web sites. Figure 2 illustrates that slightly more than half (51.5%, $n_{1/4}$103) of the CILs included a newsletter or calendar of events on their site. Several web sites allowed the user to subscribe to an electronic version of the newsletter. A few sites had more than one newsletter on their site, such as a newsletter specifc to issues for individuals who are deaf or who are older.

Sites also allowed consumers to submit an article over the web for the newsletter. Thirty-nine sites (19.5%) posted current job opportunities with the organization and nine (4.5%) sites had a job bank on the site or provided a link to a local or national job bank on the Internet. E-commerce was observed on 13 (6.5%) sites and usually involved the purchase of items from businesses that would donate part of the proceeds to the organization.

Use of Forms

Over one-third of the sites (34.5%, $n_{1/4}$69) were using forms; 55 sites (27.5%) provided forms that could be submitted as compared to 21 sites (11%) that had printable forms requiring an individual to send through the postal mail. Half of the 69 sites were using forms for service (50.7%, n 35), followed by donations (20.3%, n 14), and volunteer solicitations (18.8%, $n_{1/4}$13). Of the 35 sites providing forms for service, 80% (n 28) provided service forms that could be submitted over the web compared to only 9% (n 3) that had printable service forms. The remaining 11% had both types of form. ¼

Innovative uses of forms on sites included an application for consumers to attend travel training courses and to solicit volunteers for the program (IL Resources in Oregon), to receive benefts counseling (Kenai Peninsula IL Center in Alaska), and to apply for employment at the CIL (Placer Independent Resource Services in California and Southern Minnesota IL Enterprises & Services (SMILES)). Other sites provided forms for consumers to access community emergency programs or were conducting on-line consumer surveys (for example, see Catskill CIL in New York). Forms were commonly used for site visitors to submit information and referral questions or to make other inquiries.

Types of Email

A majority of sites provided an email address (86.5%, $n_{1/4}$ 173) to contact the organization. Of the 173 CILs that provided at least one email address, 50 (25%) provided staff member specifc email addresses. Nineteen (10.9%) sites included all three types of email. The most frequently occurring combination of types of email address was the executive director's and staff member specifc (21.5%, $n_{1/4}$ 43).

Extensive CIL Web Sites

Ten sites were observed providing all four core services. One of these sites was a virtual CIL without a ''bricks-and-mortar'' offce. CyberCIL of Arizona had numerous worksheets for consumer use on various topics. Examples included how to fnd a job, transportation, budgeting/fnancial management, home safety, and a self-administered systemic advocacy pre-test. Staff members were available through email. For peer counseling, the CIL provided a discussion board, a chat room, and private consultation by email with a peer counselor.

CILs with extensive resources on web sites not previously mentioned include TriOnline connected to Taconic Resources for Independence in New York, Independence Inc. in Kansas, Southern Tier in New York, Abilities in Motion in Pennsylvania, and Metropolitan CIL in Minnesota.

Sites had other innovative features that demonstrated their efforts to provide aspects of their services and programs on the Internet as well as to provide an alternative method for consumers to access disability resource information. The limitations of space here allow for a brief highlight of the fndings. More detailed information may be found at CIL sites using the ILRU directory of CIL on line found at http: //www:ilru:org /jump1:htm.

Acccessibility Features

The results of the accessibility feature data indicate that, although many sites provided aspects of web-site accessibility, many home pages of these sites did not pass the Bobby utility program. The majority of sites did provide evidence of accessibility awareness and the use of Bobby accessibility standards. However, the total absence of or inconsistency in the use of alternative text descriptions for graphics prevented a large number of sites from passing the Bobby utility program.

Table 1. Percent of CILs web site home pages with specifed accessibility features: ten-point accessibility list

Access feature	%
No use of frames	94.5
Text-based descriptions on all graphics	44.6*
No content text as graphics	66.5*
Use of site map or table of contents	83.0
High color contrast	97.5
Meaningful links	89.8
Image maps have text link alternatives	65.9**
Adequate space between links and buttons	81.9
Text-only version of site	13.3*
No fashing items, pop-up windows or scrolling text	90.0

Notes
(i) A higher percentage indicates a higher number of web sites with this accessibility feature.
(ii)*Percentage is based upon the 188 sites with graphics.
     **Percentage is based upon the 167 sites with a navigation method on the home page.

Ten-Point List of Accessibility Features

With the exception of ALT tags and text-only versions, Table 1 illustrates that the majority of CIL web sites provided at least one of these accessibility features to its users. A higher percentage in a category in Table 1 indicates a higher percentage of CIL web sites with this web accessibility feature. As demonstrated by the data, accessibility problems such as the use of frames, poor color contrast, or fashing items were rarely observed.

Text-only versions are used frequently as a substitute by web site developers for designing an accessible graphic web site. This alternative to graphic sites addresses the accessibility problems associated with the use of a graphic user interface on a web site. Thus, web site developers that incorporate a text-only version may focus little attention to the need for accessibility of their graphic site.

We did not fnd this pattern with the CIL sites that had a text-only version on their site. Of the 25 CIL sites with text-only versions, 76% of these sites used alternative text descriptions ($n \frac{1}{4}$ 19) on the images of the home page. Of the 187 sites with graphics and that generated a Bobby report, 21% more CIL sites with a text-only version had no ALT tag errors (64%, $n \frac{1}{4}$ 16), compared with those sites without a text-only version and no ALT tag errors (43%, $n \frac{1}{4}$ 68).

Priority 1 Errors from the Bobby Reports[1]

The three main errors causing the sites to fail Bobby were the absence of a text equivalent description of graphic images (ALT tag errors), the use of frames without proper labeling (frame errors), and hot spots within image maps (hot spot errors). Of these types of error, the most frequently occurring was the lack of an alternative text description for at least one graphic.

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[1]One of the sites did not generate a Bobby report, leaving the total number of sites at 199 for information derived from this source.

Of the 187 sites that had graphics and generated a Bobby report, slightly over half (55%, $n_1 = 102$) had at least one graphic image that lacked an alternative text description [2] ($n_2 = 899$, $M = 4.81$, SD $= 13.52$, range 0 – 129). The number of sites with and frequency of no ALT tags for images on the home pages was greater than the number of sites with and frequency of image map hot spot errors that lacked an alternative text description ($n_1 = 17$, $n_2 = 130$, $M = 0.70$, SD $= 4.47$, range 0 – 57) and frame errors ($n_1 = 7$, $n_2 = 16$, $M = 0.08$; SD $= 0.453$, range 0 – 3).

Errors of Text Equivalent Descriptions for Graphics

For the vast majority of home pages (80%, $n = 82$), the absence of ALT tags on at least one graphic image was the only Bobby Priority 1 error. In addition, the majority of those CIL home pages with this error (52%, $n = 53$) had two or fewer ALT tag errors. Of the 102 sites with ALT tag errors, slightly over one-quarter (30%, $n = 31$) had only one missing ALT tag on the home page. For 27 (26%) of the sites with missing ALT tags, the lack of this tag on only one graphic was the sole error that caused the home page to fail the Bobby program.

Use of ALT Tags

Despite the high number of CIL sites with home page ALT tag errors, almost three-quarters of the 187 sites with graphics did utilize some ALT tags (73%, $n = 136$) to describe the images on the home page. Of the 102 sites that had ALT tag errors, slightly over half (53%, $n = 54$) used at least one ALT tag on the home page. Consequently, despite the use of alternative text descriptions on over half of the pages with ALT tag errors, the inconsistency in usage caused the home page to fail the utility program.

Manual inspection of the descriptive quality of the text in the ALT tag indicated that, of the 136 sites that used alternative text descriptions, the majority, 82% ($n = 112$), consistently provided an appropriate description of the graphics. Appropriate descriptions meant that none of the ALT tags on the site were empty boxes, had simply the name of the fle, or were describing the wrong graphic. Of the 54 sites that used ALT tags but had at least one ALT tag error, three-quarters (76%, $n = 41$) had appropriate descriptions in the tags that were provided.

Approval by the Bobby Utility Program

Overall, 92 (46.2%) of the 199 CIL web sites that generated a Bobby report passed the Bobby Version 3.2 automated check. Forty-nine (53.2%) of these 92 sites displayed a Bobby icon, most commonly on the home page. Of the 49 sites that displayed a Bobby icon, a little more than one-quarter, 14 (28.5%), were not approved by the utility program. Since prior versions of the program had different accessibility standards, we examined information identifying the version of the

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[2] n_1 is the number of web sites with the specifed error; n_2 is the number of errors for all web sites with that error.

utility program used in site creation. Ten of these 14 sites had utilized   earlier versions of the Bobby utility program, suggesting that the site originally met Bobby standards but failed the current criteria of the program.

Noteworthy Accessibility Features

Unique accessibility features provided on sites included a user option to select color contrasts to view the site (Wisconsin's Independence*FIRST*), a large print version of the site (Arizona Bridge to IL, SMILES in Minnesota), and the entire site in Spanish (VOLAR in Texas) to complement the English version. Some sites encouraged users to comment on the accessibility of the web site.

LIMITATIONS OF THE PRESENT STUDY

There are several limitations to the present study associated with measuring the types of service over the web and accessibility features. In relation to disability services on the web sites, the coding scheme for this study is not exhaustive of all possible methods or types of disability service developed by the CILs on their web sites. Since the structure of services provided by these organizations vary based on the needs of the community, some CILs may view aspects of their web site as part of the core services in a manner different from the coding scheme for this study. The information presented should be viewed as a frst general portrayal of how CILs might categorize certain disability services and programs provided on their site.

In relation to accessibility, the individualized measurement of web site accessibility features is, of course, limited to the review of particular sites at a given time. Moreover, many of the home pages that did not pass Bobby nevertheless had other extensive accessibility features. Sites were observed using numerous text equivalent descriptions of images and text link alternatives for image maps; however, the home page failed Bobby due to the lack of a text-based description on one of the advertisements or on the hit counter at the bottom of the page. Since we did not measure accessibility features by their essential function for content comprehension or navigation, it is not possible to generalize with confdence that a certain percentage of sites should be described as inaccessible.

Other studies utilizing the Bobby utility program as a main measurement of accessibility likely face similar issues when attempting to assess this increasingly important aspect of the Internet. Usage of accessibility features on a web site may be viewed as a continuum ranging from vital features that affect usage of the web site (such as navigation elements) to non-essential features that enhance comprehension but do not affect usage (such as ALT tags on images representing borders or bullets).

Although the Bobby utility program does prioritize various accessibility features, one of its limitations is that it does not make distinctions regarding, for example, the lack of an alternative text description that affects usability of the site versus the lack of these tags on a peripheral pictorial aspect of the web site's design. In addition, it is unknown how many sites were originally accessible when launched and, yet, due to the continual updating of the site, now lack some accessibility features.

Lastly, although the standards for web site accessibility prescribe consistent use of certain features, it may not be appropriate to describe web sites that demonstrate

other features of accessibility, particularly for essential usage elements, as completely inaccessible. We hope that the present study, along with future research, will further discussion among researchers, policymakers, and advocates on the measurement and importance of web site accessibility to persons with disabilities.

DISCUSSION

This article examined 200 CIL Internet sites across the United States during the period of April to August 2001. The fndings illustrate that these organizations have a presence on the Internet and are providing their services and programs. The web site features that were assessed highlight originality in adapting the Internet as a medium to promote consumer management over services, peer exchange, disability resources in local communities, advocacy, employment, and current information.

In general, the majority of CIL web sites conformed to aspects of the Bobby utility program and provided certain accessibility features. Although it appears problematic that fewer than half of the CIL web sites passed the Bobby utility program, the results indicate that the most common accessibility obstacle appears to be lack of or inconsistent use of ALT tags. As discussed by Klein et al. (2003), correcting this problem involves a relatively easy modifcation of a web page.

If the ALT tag errors on the CIL home pages were corrected, the majority (87%, n_{1} 174) would pass Priority 1 of the Bobby utility program. Nonetheless, the lack of ALT tags does signifcantly restrict the use of a web site for persons who rely on this alternative method to access information and navigate a site that uses a graphic interface.

Although relatively few CILs provided text-only versions of their site, the absence of this accessibility feature may be refective of preference given to designing accessible graphic web sites rather than a lack of attention to accessibility. Text-only versions, as a main accessibility feature, have considerable disadvantages. They are updated less frequently than the graphics version of the site and often contain a portion of the information that has been placed on the graphic site (W3C, 1999b).

Few web sites may have as many accessibility features as observed on the CIL sites. Recent research assessing federal web site compliance with Section 508 of the Rehabilitation Act demonstrated the continued lack of attention to accessibility on the web. Although Section 508 includes provisions for enforceable federal web site accessibility standards, Stowers (2002) found that only 13.5% of federal government web sites passed the automated Section 508 standards of the Bobby utility program. For CILs, as they ensure the physical accessibility of their offces to accommodate the needs of individuals with disabilities, the fndings suggest that they must continually review the technological accessibility of their web sites.

Service provision over the web seems a promising complement to traditional methods. CIL web site development may prove to be a crucial means of providing certain IL services to consumers in the almost 800 counties in the U.S. that do not have access to CIL services (Seekins et al., 1998). With limited staff and fnancial constraints, it is unlikely that many CILs have a web developer in house and instead rely on outside groups to maintain their sites, including volunteers with limited experience in accessibility issues.

To effectively incorporate web site services into CIL service provision, these organizations will need access to technical assistance with technology. In the 1998 annual reports to RSA, CILs highlighted as among their top priorities the need for training and technical assistance on computer skills, information management systems, and electronic networking (ILRU, 2000). There also is an emerging need for technical assistance with issues related to providing services over the web such as maintaining secure pages that ensure confdentiality of consumer information and record keeping using this medium of service provision as well as ethical issues related to computer-mediated communication.

One of the major issues for CILs is procuring adequate funding to support service delivery and to expand services to counties not covered by a CIL (Means & Bolton, 1994; Seekins et al., 1998). The present investigation illustrates that many CILs have been able to maintain sophisticated web sites that expand the reach of their services and programs. It would be important to examine whether those CILs with strong fnancial capabilities are able to more successfully develop and maintain accessible web sites for consumers. In addition, other questions related to web service provisions merit investigation, such as how virtual services change the provision of service, as well as consumer satisfaction with this method of service.

Independent of CIL service provision on the Internet, Americans with disabilities generally lack access to computers, the Internet, and assistive technology (Kaye, 2000; Schartz, Schartz, & Blanck, 2003). As civic and public life is increasingly tied to the Internet, it is imperative that policy makers continue to implement measures and reaffrm their commitment to afford information technology access to all individuals (Blanck, 1994; Berven & Blanck, 2000).

Recent policy developments represent important steps towards the goals of universal design of and access to the Internet, foremost including the enactment of Section 508 (2001, available at http:// www:access-board:gov). As mentioned above, Section 508 requires that electronic and information technology purchased by the federal government meet accessibility standards for persons with disabilities (Blanck & Sandler, 2000).

Another important contemporary policy initiative includes President Bush's community living barrier removal plan, entitled the New Freedom Initiative (2001, available at http: //www:hhs:gov/newfreedom). National research initiatives, such as the new technology for independence community-based resource projects, funded by the National Institute on Disability and Rehabilitation Research (NIDRR), will provide important information on the access barriers and facilitators to technology (see Blanck et al., 2003a, this issue).

Almost ten years ago, with the emergence of the Internet, Blanck (1994) contended that, although many issues concerning web accessibility are unresolved for disability advocates, policymakers, educators, and others concerned with full inclusion for people with disabilities, fve vital precepts will remain constant.

(i) Accessibility must be built in, not added on. Universal design will beneft all users, not merely those with disabilities. The government's role is emerging in mandating universal design and in setting standards.
(ii) As technology increases in signifcance, attention to accessible technology takes on greater urgency. The Internet must not be off limits to people with disabilities.

(iii) Technology has the potential to make work, education, and daily life vastly more inclusive through individualized curricula, supported communication, tele-work and other innovations.

(iv) Accessible technology has implications beyond disability: for health care reform, tele-medicine will bring doctors to geographically isolated people; for welfare reform, tele-training and tele-work will reduce chronic unemployment and underemployment.

(v) Dialogue and research are needed on emerging technological accessibility problems, not only for people with disabilities, but for the inclusion of others from diverse social and economic backgrounds.

Accessible technology for persons with disabilities has the potential to enhance independence in life. Its future development holds promise for a wide range of persons with disabilities, including those with communication disabilities who use symbol language. Emerging research includes language projects that facilitate symbol-to-symbol and symbol-to-text conversion programs through computer-mediated communication (such as the Internet) for non-verbal users (WWWAAC, 2002).

The commitment to digital equality as a civil right must be founded in policy that incorporates accessibility and universal design in public and private programs providing technological access to all (Berven & Blanck, 2000; Blanck & Schartz, 2001; National Council on Disability, 1996). As leaders in the disability rights movement and independent living service provision, CILs have a crucial role to play in this dialogue on access to, and the use of, emerging technologies to empower all individuals with disabilities.

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