Improved technology and an aging work force are making presentations by and for people with disabilities more commonplace. Indeed, accessibility for professionals has never been better — but there’s a long way to go.

how technology is opening the stage to people with disabilities

by Dave Zielinski
The prospect of presenting in public once filled Dick Hosty with more than a little trepidation.

These weren't the normal pre-speech jitters, mind you, but deeper concerns about whether his audiences would grasp the words and concepts flowing from his mouth. Hosty, a regional coordinator for the Missouri Alliance for Individuals with Developmental Disabilities, has cerebral palsy, which can make his speech difficult to decipher. Since a growing part of his job was to deliver presentations and training sessions about disability issues throughout the country, his was no idle concern. But advancing technology threw Hosty a lifeline. Using a device called the Speech Enhancer from Electronic Speech Enhancement Inc. (www.speecheenhancer.com) of Bridgeton, Mo., Hosty now speaks into a small microphone, which, using the latest in voice-processing technology, adds not just volume but a level of articulation and clarity to his voice without making him sound robotic. The upshot is that most audiences have an easier time understanding him, Hosty can speak longer with less fatigue, and a career door that once appeared to be merely ajar is propped wide open.

People with speech impairments are hardly alone in benefiting from assistive-technology developments that create a more level playing field with the nondisabled work force. People with vision, hearing, mobility or other physical disabilities have unprecedented access to adaptive tools that allow them to use common computer software applications, communicate more effectively with colleagues, take distance-learning courses and participate in live or archived presentations delivered via the World Wide Web. Indeed, these technologies have made it possible for people with disabilities to participate in areas of the professional world that were completely closed to them as recently as five or 10 years ago.

The unmet goal: Access for everyone

That's the cheery news. The more sobering report is that, despite the federal Americans with Disabilities Act of 1990 (ADA) and more recent legislation designed to create equal access to Internet-age communication tools, the great majority of organizations still drag their feet about equipping Web sites, Web-based multimedia presentations, homergrown software applications and certain training materials for visually- and hearing-impaired people.

Yet aside from the obvious legal and moral reasons to do so, organizations have a more pragmatic rationale for creating expanded accessibility. With unemployment at historically low levels and jobs still going begging in many sectors of the economy, it makes good business sense to hire qualified people with disabilities and to take advantage of new assistive technologies - many of which are dropping in price - to help them become as computer-savvy and productive as their counterparts who don't have disabilities.

An aging work force

The other reality is that the U.S. work force is increasingly graying. During the next 10 to 20 years, as aging baby boomers extend the boundaries of their working lives, the occurrence of temporary or permanent disability among those in the workplace, whether it is moderate hearing loss, carpal tunnel syndrome or more serious diseases, will likely increase.

Many new technologies can help these people remain productive on the job for longer periods.

As with most things slow to change, awareness and sensitivity remain the biggest stumbling blocks. "Much of the technology is now there to make [accessibility] happen," says Eric Damery, vice president of business development for Inter-Joyce Inc., a company in St. Petersburg, Fla., that makes assistive technologies for blind people. "But too many companies either remain unaware of these tools or operate on misconceptions, like the one that blind people will never be able to use computers as well as sighted employees."

Advances for visually impaired people

The ability to perform proficiently with e-mail, computer software applications and the Web is more crucial than ever to the employability and productivity of blind workers. According to the U.S. Department of Labor, 74 percent of working-age blind people remain unemployed in this country and, without computer skills approaching those of sighted workers, their odds of getting gainful employment grow longer still.

The arrival of the graphical user interface (GUI), which relies heavily on visual cues for navigation, wasn't exactly cause for celebration in the blind community. Fortunately, plenty of adaptive software programs exist to help computer users with visual impairment survive -- and in many cases thrive -- in the GUI environment. Many use screen-reader programs to surf the Web, for instance. Using speech synthesizers, the software reads aloud, in a computerized voice, the text
and names of icons that users encounter. Rather than using a mouse, which requires sight to move and point onscreen, blind users navigate via keyboard, hitting the tab button to move from icon to icon. The software can interpret whether a user has tabbed to a list box, a button, a logo or other graphic element.

**Alt-tags and screen readers**
How does the software translate graphics or photos? Here's where accessibility-sensitive Web-page design comes in. If nontextual items are appropriately labeled with alternative textual descriptions, called *alt-tags*, blind users can interpret those items on Web sites as well. Without alt-tags, when a screen reader encounters a graphic, it simply reads the file name, which is usually an unintelligible string of letters.

Among the most popular screen readers for Windows operating systems is JAWS (Job Access with Speech) from Henter-Joyce Inc. (800.336.5658, www.hj.com), a division of Freedom Scientific. The software, which sells for $995 for use with Windows 95 or 98 and $1,395 for Windows NT 4.0 or 2000, is sold in 20 countries, translated into many different languages and has a client list that includes Federal Express, Marriott, Pizza Hut, and such educational institutions as MIT, Stanford and UCLA.


Some screen readers even give blind users a few advantages over their sighted counterparts they have been provided since they started out.

**THE AGE OF ACCESS**

they oughta
(and they did,)

In a perfect world we would have little need for a federal mandate to convince organizations to make presentation, meeting or training content fully accessible to the disabled community. In our flawed and bottom-line-driven world, however, nothing short of a whack with a large stick — the threat of legal action or negative publicity — motivates most organizations to get their accessibility facts together.

Yet the prevailing belief is that the Americans with Disabilities Act of 1990 (ADA) hasn’t lived up to its potential for quelling discrimination against disabled workers, and that fear of potential lawsuits still makes less-enlightened employers steer clear of hiring workers the ADA might cover.

Perhaps. But as of summer 2000 the reality is that more and more groups have kept tabs on corporations and educational institutions to make sure they are fulfilling their accessibility responsibilities. Also, a flurry of new laws have been passed since the ADA mostly because...
pass a law
but is it working?)

the Internet boom), making it more hazardous
than ever to close off access to Web sites, Web-
based presentations or distance-learning cours-
es to blind, deaf and other disabled workers or
students.

America Online has seen the renewed
activism firsthand. In November 1999, the
National Federation of the Blind (NFB) filed
suit against AOL’s Internet service — the
largest in the country — for being inaccessible
to blind people and for allegedly violating Title
III of the ADA, which requires entities to fur-
nish “appropriate auxiliary aids and services
where necessary to ensure effective communica-
tion with individuals with disabilities" unless
doing so would result in fundamental alteration
to the program or service or cause undue bur-
den.

The NFB lawsuit charges AOL with violating
the ADA’s “reasonable modification” and “full
and equal enjoyment” mandates. It states
specifically that AOL, unlike some other ISPs,
“has designed its service so that it is incompati-
ble with screen access software programs for
the blind. Blind people use such software to
monitor computer screens and convert text into
synthesized or braille.

Many of the disability-related legislation
enacted since the ADA is designed to protect
equal access on the Internet and
other new communication vehicles.

The provisions laid out by the
Telecommunications Act of 1996, for
instance, require telecommunications
equipment manufacturers and service
providers to ensure that such equip-
ment and services are accessible to
people with disabilities, if readily
achievable. Congress also passed the
Individuals with Disabilities
Education Act of 1997, the Assistive
Technology Act of 1998 and the
Work force Investment Act of 1998,
which amended section 508 of the
Rehabilitation Act. (For more details
about what these laws cover, visit the
section on legal mandates from the
U.S. Department of Justice Guide to
Disability Rights Laws at the
WebABLE site at www.webable.com.)

Clearly, there’s never been a better
time to make sure you’re operating at
the intersection of the right and law-
ful thing to do.

• D.Z.
Creating accessibility doesn’t mean eliminating multimedia, snazzy graphics or all Java applets. Nor does it require undue time commitments.

According to Curtis Chong, director of technology for the National Federation of the Blind (NFB) in Baltimore, "It makes a Web page more like a word-processing environment." Many screen readers work in conjuction with refreshable Braille displays, devices that convert computer-screen content to Braille characters. The tools translate text onscreen to a single line of continually changing Braille. "It allows someone who might be both deaf and blind to use a screen-reader system, because although they don’t hear what’s on the screen, they can feel it," says Henter-Joyce’s Darnery. But Chong says refreshable Braille displays remain fairly expensive, as does the cost of building machines that can display multiple lines of text.

Web designers: Helping or hurting?

Despite these advances, plenty of obstacles remain for blind people in the computer domain, including accessing multimedia presentations on the Web or keeping pace with regular upgrades of off-the-shelf software or browsers. "It’s a continual race between assistive technology and advances in Web page design," says NFB’s Chong. "Right now it’s very tough for us to run Java applets, for instance, although I expect that to be fixed down the road." Likewise, little progress has been made in making nonstatic graphics — animation — accessible to blind people. "The more animations and the less accessibility does mean following some basic guidelines, including these:

- Use alternative textual descriptions, alt-tags, to provide brief descriptions of graphics or images. For example, include the text 'Acme corporation logo' alongside a logo on a site.

- Avoid the use of complex multicolored tables. Assistive technologies typically read one entire line at a time across multiple columns, instead of reading each column separately.

- Write meaningful hypertext links. A nondescriptive "click here" link tells the blind navigator using assistive software nothing about that link.

For many more guidelines to create Web pages that are accessible by people with visual impairments, visit the Web site of the World Wide Web Consortium (W3C) Accessibility Initiative at www.w3.org/wai.

You can also easily test your site’s baseline accessibility. A tool called Bobby (www.cast.org/bobby), created by the Center for Applied Special Technology (CAST) analyzes Web pages for their accessibility to people with disabilities. Submit your Web site’s URL and Bobby tests it using the W3C’s guidelines, issuing a report indicating any accessibility or browser compatibility errors found. If your site receives an approved rating, you can display a "Bobby approved" icon on it.

Other tools for blind people

A host of other tools also stands ready to assist visually-impaired people. Screen magnification software, such as ZoomText from GW Micro Inc. and MAGic (Magnification in Color) from Henter-Joyce, magnify screen content — for instance, a PowerPoint presentation downloaded from the Internet — from two to 20 times, including horizontal and vertical panning options.

And while screen-reader technology enables blind users to access e-mail, other products allow them to send and receive e-mail using standard touch-tone telephones.

One such voice/e-mail system, called MyInBox from CrossMedia Networks Corp. (877.726.7877, www.myinbox.com), Herndon, VA, costs $7.95 a month. Users can listen to their messages — speed and volume are controlled by saying into the phone, "Speak slower" or "Speak faster." They can send e-mail by saying, "Dictate new message," and indicating to whom in their address book they want the message sent. The system also can filter and forward messages.

Additional tools include refreshable Braille note-takers, Braille embossers (print Braille) and accompanying text-translator programs, Braille keyboards and voice services that read aloud such information as the day’s news from online business wires. (For more about these tools’ costs and uses, visit the National Federation of the Blind’s site at www.nfb.org.)

PowerPoint for the few — and the many

Certainly, assistive technologies exist to help make communication by and for disabled people easier, but what if a blind person were to sit in your audience tomorrow? Would you know how to make your presentation comprehensible to that person?

Although presenters can do plenty of things to make PowerPoint-based presentations more accessible to visually-impaired people, converting PowerPoint text to Braille, although commendable, isn’t at the top of the list, according to the NFB’s Curtis Chong. "I’ve had Braille ver-
WebABLE
www.webable.com
Contains details on the latest legislation covering accessibility issues and a database of accessibility resources, bookmarks and assistive-technology tools.

World Wide Web Consortium, Web Accessibility Initiative (WAI)
www.w3.org/wai
With organizations around the world, the WAI pursues Web accessibility through five areas: technology, guidelines, tools, education and outreach, and research and development. The site offers guidelines for developing accessible Web pages.

National Federation of the Blind (NFB)
www.nfb.org
Offers a vast collection of resources about legislation covering equal access for the blind, vendor links for the latest assistive technologies and tools and guidelines for creating accessible Web sites.

National Center for Accessible Media (NCAM)
www.wgbh.org
The Web site of Boston-based public broadcasting giant WGBH not only provides a good model for creating accessible pages, but you also get the inside story on closed captioning from the people who invented it (click on the "media access" link), as well as information on descriptive video and how the CPB/WGBH National Center for Accessible Media is working to make Web sites accessible to all.

The Rehabilitation Engineering Research Center (RERC) on Hearing Enhancement
www.hearingresearch.org
Addresses accessibility problems of deaf and hard-of-hearing individuals by developing and evaluating cost-effective technological aids.

- D.Z.
Technology: A mixed blessing?
Chong believes the new assistive technologies have proven a mixed blessing for blind people. "People look at all this talking technology and say, 'Gee, isn't it great, now blind people are on a level playing field with the sighted whether the audio accompanies video clips and audio presentations or is streaming audio or phone conferencing at the centerpiece of a live Web conference."

One current option is coding audio files with a form of markup language called Synchronized Multimedia Integration Language (SMIL, pronounced "smile"), explains Mike Paciello, chief technologist officer for WebABLE, a one-stop Web site for accessibility-related Internet resources. Paciello says SMIL can be used to mark up and adequately caption both RealPlayer and QuickTime formats. (For more information about SMIL, including tutorials, authoring tips and examples of presentations, see www.w3.org/audiovideo.)

Microsoft Corp. also has its own captioning system, called Synchronized Accessible Media Interchange (SAMi), which simplifies multimedia captioning for developers, educators and multimedia producers. The SAMI file format specification is available to the public as an open standard, meaning no licensing fees are involved. Interestingly, the Microsoft SAMI Web site (www.microsoft.com/enable/sami) suggests that the majority of closed-captioning users aren't deaf. Instead, they're people who want to learn a second language, those forced to listen to content in habitually noisy environments and even students learning to read who want additional practice.

Toward access for hearing-impaired people
Many organizations and media have long provided closed-captioning options for internal communications, training programs beamed from a distance, regular TV programming or cable programming. Multimedia presentations or training content delivered on the Web, however, are new areas to consider when providing equal access for people with hearing impairment. Deaf and hearing-impaired people need ways to access audio that is delivered over computer networks, visual elements, including actions, gestures and scene changes.

As with many accessibility issues, the biggest obstacles to widespread use of closed captioning in Web-based and other multimedia presentations are time and cost — in this case, for converting spoken words and sounds to full text. Consider that adding captions to a one-hour TV program can take as many as 30 hours, even using specialized software, according to estimates from The Caption Center at WGBH, the Boston-based public broadcasting company that is home to the National Center for Accessible Media (NCAM) and the originator of closed captioning.

Says WebABLE's Paciello: "The real issue of providing captioning and descriptive video on the Web for people with disabilities isn't so much that the tools don't exist; it's more a problem of getting organizations to invest the time and resources." Real-time captioning, for instance, requires the combined skills of court stenography and computer proficiency, which can come at a price tag of $75 to $100 an hour, he estimates. "But organizations have to remember that in many cases it is mandated by federal law that they caption their content," he adds.

Help is on the horizon. Paciello knows of at least one company that has developed a Java-based application that automatically translates voice to text for captioning purposes. The question, of course, is how accurate the use of voice-recognition technology for captioning will be. Some organizations, such as Fiewest-Packard in Palo Alto, Calif., already offer hearing-impaired employees teletypewriter (TTY) service, with which a hearing person's response on the phone is...
transmitted into text to be read by a deaf person on a text-telephone screen.

Advances for speech-impaired people

Technology also has come to the aid of presenters and trainers with speech impairments — not only to those with soft, raspy or inaudible voices, but those with unclear or unintelligible speech. Included among them are speakers who have had surgery on or near their vocal chords or who have been afflicted by cerebral palsy, Parkinson's disease, spasmodic dysphonia, stroke or even amyotrophic lateral sclerosis (ALS, often called Lou Gehrig's disease).

Products, such as the Speech Enhancer and Spectrum VP from Electronic Speech Enhancement Inc. (ESE), use the latest voice-processing technology to turn unclear or slurred speech into vocalizations that can be readily understood by an audience, which can reduce a speaker’s fatigue level. For years, the only option for speech-impaired people has been the venerable voice amplifier. But this device did little for voice clarity; amplifying unintelligible speech only produced louder unintelligible speech.

Voice processors, in contrast, use the latest developments in microelectronics to rebuild vocal sound-wave forms. A user talks into a miniature microphone, with the unit hung from a belt or on a wheelchair. The listener or audience hears the speaker's own inflections, emotion and dialect, but with significantly improved clarity. The battery-powered processor adapts to a presenter's unique voice characteristics, analyzes resonance and phonation, then automatically makes a best-fit clarification of speech.

The processors also do a better job than many standard voice amplifiers of blocking out background noise, enabling soft-spoken presenters to be heard in noisy environments. Because of that feature, some fire departments have adopted the tool; firefighters amid roaring background noise often struggle to be heard on conventional radio systems. Effective, timely communication can sometimes mean the difference between life and death.

As for price, Donna Jordan, ESE vice president of marketing, says the company’s three products — the Speech Enhancer, Spectrum VP (a lightweight unit designed specifically for the business world) and a version for children affectionately called Mighty Mouth — each sell for between $5,000 and $6,000. Wireless speakers can be added for an additional $1,500. The good news is employees are often eligible for third-party funding based on medical necessity; insurance companies, Medicaid, vocational rehabilitation centers and other sources usually cover costs of these voice enhancers, “often under the rationale that the devices help them obtain and keep employment, reduce assisted care and stay off of full disability, which is more expensive,” Jordan says.

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