

ICT Accessibility in the U.S. — Developments in Public and Private Sectors —

● David Olive ● Jamal Le Blanc

(Manuscript received October 10, 2004)

In 1998, the U.S. Congress amended Section 508 of the Workforce Rehabilitation Act to require Federal agencies to make their electronic and information technology accessible to persons with disabilities. This amendment fundamentally changed the responsibility placed on Federal agencies in relation to the accessibility of IT products. Section 508 now requires Federal agencies to procure accessible IT products for Federal workers and also make public information and data accessible. Responding to Section 508, industry has taken a leadership role by developing new assistive technologies (ATs) that incorporate information technology. Industry has also been central in creating a vehicle for businesses to convey to the U.S. Government the accessibility features of products. In the process, IT and AT companies, which increasingly rely on information and communications technologies (ICTs), are becoming aware of the competitive benefits of designing for the widest range of possible users. This paper examines the current state of ICT accessibility in the United States.

1. Introduction

In the U.S., the assistive technology (AT) industry designs, manufactures, and markets devices used to increase, maintain, and improve the functional capabilities of persons with disabilities. Products that are AT devices encompass a range of technologies and engineering disciplines. Increasingly, however, AT devices are becoming more complex, increasingly utilizing information and communications technology (ICT), requiring manufacturers to integrate a variety of engineering and manufacturing processes and components. Examples include: computer-controlled wheelchairs, voice recognition software, refreshable Braille displays for computers, advanced hearing aids, remotely controlled door-openers, speech synthesizers, direction finders, communications devices, and an array of other items.

Advances made in the interface technologies of networked communications applications have

brought new opportunities for persons with disabilities to participate in educational, employment and civic activities through the use of ICTs. Advances in these technologies allow for greater independence for persons with disabilities, while supporting each person's personal initiative. Still, the freedom that can come from the strategic use of ICT by persons with disabilities depends on good design and adequate access to such technologies.

As assistive technology moves away from the use of complementary AT products to accessible ICT solutions, IT and communications companies must become aware of the need to incorporate accessibility within their products' designs and marketing.

This paper examines the current state of ICT accessibility in the United States. In our research, we engaged a number of experts and reviewed published documents regarding ICT accessibility. Our research indicates a greater appreciation that

the accessibility movement in IT is mainly being driven by the purchasing power of the U.S. government, and secondly by market and other motivations of corporate responsibility.

2. History and explanation

The U.S. Congress has recognized in several instances that market forces alone are not sufficient to protect the interests of persons with disabilities.¹⁾ There are many reasons why market forces alone are not sufficient but two stand out:

1) Market fragmentation

Although persons with disabilities comprise a large segment of the population, in terms of assistive technology needs they are quite fragmented. This fragmentation is due to the variety in physical impairments and the variance in the manner in which individuals relate to physically similar impairments. Due to the individual nature of impairments, the disabled community, though large, is not coherent. Accordingly, it is difficult for any small group to exert enough influence on the market to shape industry trends.²⁾

2) Earning Power

A second reason for the lack of market power is that as a group, statistically, persons with disabilities earn far less than their non-disabled peers.

In the absence of consumer demand, there are government-driven, supply-side influences. In the United States, the purchasing power of the government procurement system exerts the most influential pressure on the accessible design of ICT products for information and communications technology companies.

After passage of the Americans with Disabilities Act in 1990, accessibility advocates urged the Congress to review the older Rehabilitation Act of 1973, as amended, to add enforcement provisions. The law had already been amended in the 1980s. But these earlier changes did not mandate that Federal agencies follow guidelines on the procurement of accessible computer and

electronic technologies. Nor did these changes provide a means of accountability for holding the agencies responsible for their procurement decisions.

Congress amended the Rehabilitation Act in 1998 to require Federal agencies to make their electronic and information technology accessible to persons with disabilities, creating Section 508. The amendment fundamentally changed the responsibility placed on Federal agencies in relation to the accessibility of IT products. Rather than being recommendations toward responsible actions, the law now required the agencies to procure accessible IT products for Federal workers and to make information and data accessed by the public accessible as well.

3. Section 508 of the Rehabilitation Act

3.1 Objective

The stated objective of Section 508 is to require Federal agencies to “develop, procure, maintain, or use” electronic and information technology. The goal of 508 is that Federal employees with disabilities should have access to and the use of information and data that is comparable to the access and use by Federal employees who are not individuals with disabilities, unless an undue burden would be imposed on the agency. Section 508 also requires that individuals with disabilities, who are members of the public seeking information or services from a Federal agency, have access to and use of information and data that is comparable to that provided to the public who are not individuals with disabilities, unless an undue burden would be imposed on the agency.³⁾

3.2 Agency compliance

In practice, the law requires agencies to weigh the accessibility of an ICT product against the various factors that might influence the purchase of that product. All things being equal, however, accessibility should be the deciding

factor. Should agencies choose to buy a less accessible product, they are open to suit, although the actual manufacturers of the product or solutions are shielded from direct litigation. The effect of this structure is a nearly perfect system whereby the least accessible product will lose government contracts.

The requirements placed upon Federal agencies can be summarized as follows:

- 1) When developing, procuring, maintaining, or using electronic and information technology, each agency shall ensure that the products comply with the applicable provisions of the law, unless an undue burden would be imposed on the agency. If compliance presents an undue burden, then agencies shall provide persons with disabilities with the information and data involved by an alternative means of access that allows such persons the ability use the information and data.
- 2) If an agency feels that compliance presents an undue burden, then the agency must document why, and to what extent, compliance with each such provision creates an undue burden.

There are numerous exceptions to Section 508. For example, agencies may claim compliance presents an undue burden, although they must fully document why compliance would present an undue burden. Also, the law also does not require agencies to retrofit existing technologies. Upon selection of the next generation of equipment, however, Section 508 compliance plays a factor. The law also allows for significant exceptions in the areas of military functions, intelligence functions, homeland security, products provided by contractors in the incidental provision of contracted services, back-office equipment (unless directly accessed by a person with a disability), and circumstances where equivalent accommodations are available.

3.3 Focus on performance

A particularly notable aspect of Section 508 is the complete lack of government-mandated design requirements. The General Services Administration (GSA) makes Section 508 standards available online,⁴⁾ but those standards provide guidance, rather than detail on accessibility.

Additionally, each agency must judge whether AT products meet the accessibility requirements of a government purchase. Vendors complete a self-assessment of the accessibility of their electronic or information technologies, but each agency must choose the more accessible product, all things being equal.

In this way, the procurement structure that flows from Section 508 focuses on the measurement of end performance outcomes, rather than on compliance with scripted accessibility standards. The focus on outcome allows greater flexibility for industry in the design of IT products. The lack of prescribed standards also allows for industry to better incorporate accessibility into the overall design of products and services, rather than limiting industry to providing add-on assistive technology solutions. This flexibility has allowed some companies to embrace the philosophy of universal design, for example, designing for the widest range of user abilities, rather than tacking on an accessibility solution as an afterthought or as part of a process to meet fixed Federal requirements.

The effect of Section 508 on industry's design of IT products and services is interesting in that the law provides no direct penalty to the private sector for not creating accessible IT products. Instead, the penalty to industry is an indirect one: the loss of government contracts. This focus on accessibility outcomes rather than accessibility compliance creates a number of interesting outcomes:

- 1) Agencies cannot claim a product, as a whole, is not commercially available because no product exists in the marketplace that meets all requirements of the agency. Some

products will typically meet the performance criteria of a government bid. Similarly, should a government agency choose to procure a custom solution, the custom solution must factor in Section 508 mandates.

- 2) If a commercially available product meets some but not all of the standards, then the agency must choose this product or service. This places a strong incentive on commercial vendors to develop products with the broadest possible range of users, providing a strong incentive to industry to incorporate the principles of universal design.
- 3) Private companies that are not part of the traditional AT industry can provide accessible solutions by designing for the widest range of possible users.

4. Government policy or action on IT accessibility

4.1 Public online repository

The GSA provides explanations, guidance, and survey tools for companies seeking guidance on Section 508. The Website www.Section508.gov has links to explanations, guidance, assessment tools, and information on primary contact persons in the U.S. government.

4.2 Laws affecting IT accessibility

A number of U.S. laws deal with the fair treatment of persons with disabilities. Many of these laws protect against discrimination and abuse, as in the case of the Americans with Disabilities Act, which mandates equal access and accommodations. Regarding the access to technology, the U.S. body of disability laws is quite broad, taking into account everything from telecommunications access to state-level research and development support for new assistive devices. There are only a few core laws, however, that mandate equal access to services and technologies. The major laws⁵⁾ of this nature are the following:

- 1) Rehabilitation Act of 1973 — Section 508 of

the Rehabilitation Act of 1973 recognized the growing importance of information and electronic office technologies. The Workforce Investment Act of 1998 strengthened the Rehabilitation Act by requiring Federal agencies to make their electronic and information technology accessible to persons with disabilities.

- 2) Assistive Technology Act of 1998 — The Assistive Technology Act establishes a grant program, administered by the U.S. Department of Education, to provide Federal funds to support state programs that address the assistive technology needs of individuals with disabilities.
- 3) Section 255 of the Telecommunications Act of 1996 — Section 255 requires the manufacturers of telecommunications equipment and providers of telecommunications services to ensure that such equipment and services are accessible to persons with disabilities.

4.3 Research and development (R&D)

R&D data on Federal spending on assistive technology is not systematically collected across agencies and collated annually; thus attempting to discuss funding history in a comprehensive way is not possible at present. Some sources include reports by the Interagency Committee on Disability Research (ICDR) as well as the “Technology Assessment of U.S. Assistive Technology Industry,” prepared by the Bureau of Industry and Security of the U.S. Department of Commerce.⁶⁾ However, Federal spending on AT-related R&D and technologies has been increasing over time, driven in part by congressional direction and legislation.

At the National Institutes of Health (NIH), for example, expenditures for AT R&D have climbed significantly. Total funding hit \$116 million in fiscal year 2000, up from \$100.4 million in 1999 and \$79.3 million in 1998 — a 46 percent increase for the two-year period (**Table 1**). The

Table 1
NIH Assistive Technology R&D Spending (millions).

	Fiscal Year 1998	Fiscal Year 1999	Fiscal Year 2000	Change between FY 1998 and FY 2000
Total with SBIR*	\$79.3	\$100.4	\$116.0	46%
Non SBIR	\$59.8	\$79.3	\$94.8	58.5%
SBIR Only	\$19.5	\$21.1	\$21.2	8%

*:Small Business Innovation Research grant program.
Source: Strategy for the Development and Transfer of Assistive Technology and Universal Design, Interagency Committee on Disability Research, 2000.

National Science Foundation (NSF) allocated \$8.6 million to a range of disability research projects, many of which are supportive of assistive technology; \$900 000 of the NSF funds went to AT-specific R&D.

The Department of Education, through the National Institute on Disability and Rehabilitation Research (NIDRR), allocated about \$15.7 million to R&D in FY 2000 and the Department of Veterans Affairs R&D budget for assistive technology was \$5.6 million.⁷⁾

There is greater recognition today that technology plays an important role in the lives of millions of persons with disabilities and older Americans. Each day, persons with disabilities use products based on past research to participate in and contribute to society in meaningful and resourceful ways. Federal R&D funds have contributed to the advances found in assistive technology products. In the future, we expect that Federal R&D will increasingly focus on ways to:

- Ensure access by disabled persons to telecommunications and information technology, including through the application of universal design principles,
- ensure the transfer of technological developments to other research sectors, to production, and to the marketplace,
- identify business incentives for manufacturers and distributors, and
- identify the best methods of making

technology available to persons with disabilities.

5. Activities in assistive technology (AT) industry and market

5.1 Scope & diversity of U.S. AT industry

Relatively little detailed economic data exists on the AT industry in the United States, an industry that encompasses dozens of manufacturing sectors. A 1999 Commerce Department survey reported sales in 1999 of \$2.87 billion, with sales growing 21.8 percent from 1997 to 1999.

The AT industry is not cohesive or easily characterized. According to the Bureau of Industry and Security of the U.S. Department of Commerce and the University of Buffalo,⁸⁾ it includes hundreds of companies that sell more than 17000 different products to a broad spectrum of customers who can have radically different needs. The U.S. AT industry consists of large-, medium- and small-size businesses producing a wide range of products intended for a frequently limited, sometimes regulated, and often partially subsidized market.

AT companies include businesses that develop, manufacture, distribute, and support products tailored — exclusively or in part — to the needs of persons with disabilities. Software, electronics, household items, medical supplies, furniture, enhancements to existing products, and specialized devices are just a few examples. To some extent, companies are aligned in industry subgroups, such as manufacturers that make devices for persons with hearing disabilities, mobility devices such as wheelchairs, or AT products for persons who are blind.

A positive driver for industry growth is the emergence of new AT technologies — a trend that is projected to continue. Increases in computer power, improved software, and the availability of low-cost microelectronic components that have boosted other sectors of the economy are enabling AT manufacturers to integrate more technology

into AT devices. Along with ongoing advances in microelectronics, including new sensors and micro electro-mechanical systems, there is every reason to expect not only major innovations in the capabilities of today's AT devices, but also the creation of many new products.

In an effort to classify the wide variety of AT products, NIDRR has established a table of product categories for AT devices. The categories shown in **Table 2** were used in the survey to collect product information from respondents. To prevent the exclusion of any product, the survey also provided for listing items that did not easily fit any of the categories.

Technological innovations benefit persons with disabilities at the individual level and at the systems level. Assistive technologies developed for use by individuals are developed, produced, and distributed by small businesses to a limited market. Often, technology on the systems level involves large markets and large businesses.

Computerized information kiosks, public Websites, electronic building directories, transportation fare machines, ATMs, and electronic stores are just some of the current examples of the rapidly proliferating systems that people use today. The accessibility of these technologies for persons with disabilities is very important. Both large and small companies will respond to the demand, increasingly using ICTs as a way to provide solutions.

Therefore, we see in the coming years that the AT industry as presently defined by the U.S. Department of Commerce will look more like the IT industry in the products and services it offers to persons with disabilities.

5.2 Private sector leadership in promoting assistive technologies and accessible products

The private sector has also taken a key role in facilitating Section 508's agenda. Through

Table 2
Assistive Technology Product Categories.

Product Category	Description
Architectural Elements	Door opening/closing devices, door levers, lifts and elevators, ramps, safety equipment
Communication Devices	Augmentative and alternative communication devices (AAC), speech synthesizers, communication boards, board overlays, talking books
Telecommunications	Wireless and wireline telephones, text telephones (TTY), amplified telephones, talking pagers
Sensory Aids	Non-computer based devices, such as hearing aids, assistive listening devices, tactile aids for the deaf/blind, alerting devices, Braille notetakers
Computers	Hardware, software, accessories — including screen readers, large print products, optical character recognition tools, Braille displays
Environmental Controls	Remotely controlled door openers, telephones, lights, televisions
Aids to Daily Living	Aids for hygiene, dressing and undressing, toileting, washing, bathing, showering, manicure and pedicure, hair care, dental care, facial care and skin care, housekeeping, handling and manipulating products, and orientation
Mobility	Transportation safety, vehicle lifts and ramps, walking/standing aids, wheelchairs, seating systems, other types of wheeled mobility
Orthotics and Prosthetics	Spinal orthotic systems, upper/lower limb orthotic systems, hybrid orthotics, upper limb prostheses, upper/lower limb prosthetic systems, non-limb prostheses, functional electrical stimulators
Recreation, Leisure, and Sports	Accessible toys, indoor games, arts and crafts, photography, physical fitness, gardening, camping, hiking, fishing, hunting, shooting, sports equipment, musical instruments
Modified Furniture and Furnishings	Tables, light fixtures, sitting furniture, beds and bedding, adjustable height furniture, work furniture

Source: U.S. Department of Education/National Institute of Disability and Rehabilitation Research (NIDRR).

intervention of an industry group and private sector consensus, a standardized tool for articulating the accessibility features of products was created. The Information Technology Industry Council (ITI www.itic.org) developed and maintains the Voluntary Product Accessibility Template (VPAT). ITI is also active in educating businesses on the proper business use of the VPAT template. It has reached out to state governments to inform them of the tool and is encouraging European entities to consider the relative merits of industry self-assessment practices.

6. Future perspective: future laws and regulatory structures

6.1 Amending the Assistive Technology Act

In February 2001, the Bush administration introduced the New Freedom Initiative, a collection of proposals that expanded upon existing accessibility laws. In 2004, the New Freedom Initiative came before Congress as S.B. 2595, the “Improving Access to Assistive Technology for Individuals with Disabilities Act of 2004” and House Bill H.R. 4278.

Both bills would reauthorize and amend the Assistive Technology Act of 1998. The Assistive Technology Act (or AT Act) would establish a grant program under the U.S. Department of Education to provide Federal funds to support state programs that address the assistive technology needs of persons with disabilities.

The reauthorization bills would expand the provisions of the AT Act by allotting block grants to states. States would be responsible for administering a number of services, including protection and advocacy services, and expanding state-based assistive technology R&D.

The Senate version of the bill also grants the Secretary of Education the power to audit the AT industry, thus providing a better understanding of the scope of that industry and creating an accountability mechanism for Federal funds.

The goals of the reauthorization bills can be

summarized as follows:

- 1) An enhanced ability of the Federal government to provide states with financial assistance for statewide support through:
 - activities to increase access to, and funding for AT devices and assistive technology services, including financial systems and financing programs,
 - device demonstrations, and device loan and reutilization programs,
 - training and technical assistance in the provision or use of AT devices and assistive technology services,
 - information systems relating to the provision of AT devices and assistive technology services, and
 - interagency and public-private coordination that results in increased availability of AT devices and services.
- 2) Providing states with financial assistance to undertake activities that assist each state in maintaining and strengthening state-coordinated assistive technology programs.

6.2 Addressing the emergence of IP-Enabled Services

In February 2004, the Federal Communications Commission (FCC) opened a Notice of Proposed Rule-Making on Voice over Internet Protocol (VoIP) and other services that can be delivered via Internet Protocol (IP). Tentatively named IP-Enabled Services, this emerging class of communications services presents regulatory difficulties for the Federal Communications Commission. VoIP, for example, has the potential to replace traditional telephony services. Telephony in the United States has historically been considered a telecommunications service, subject to many regulatory requirements (including clear statutory requirements for accessibility originating in Section 255 of the Telecommunications Act), and enforced through subsequent decisions by the FCC. IP services, by contrast, have been considered “information services”.

Information services are ancillary services that are subject to little or no regulation.

As VoIP and IP-enabled services mature, the FCC faces a crisis in how, or whether, to regulate this emerging class of applications. Because Congress has previously recognized the importance of guaranteeing accessible telecommunications services to persons with disabilities, a number of parties are urging the FCC to consider the accessibility of IP-enabled services for such persons.⁹⁾

In comments submitted to the FCC on IP-Enabled Services, Gregg C. Vanderheiden and Judith Harkins of the Rehabilitation Engineering Research Center on Telecommunications Access (RERC-TA) at Galludet University argue strongly that the FCC will have to formally mandate certain requirements in order for IP-enabled communications services to adequately serve the disabled population.

Similar arguments have been made by the Georgia Center for Advanced Telecommunications Technology (GCATT) and by the National Association of the Deaf (NAD) in other places. The two Centers are two of several engineering research centers funded by the National Institute on Disability and Rehabilitation Research of the U.S. Department of Education.

In a paper¹⁰⁾ on the beneficial effects of high-speed broadband for persons with disabilities, the NAD reached a similar conclusion. The NAD observes that the IP applications that ride on broadband conduits offer unprecedented opportunities for persons with disabilities to reconfigure their communications experiences. The paper cites Presence, Telecommuting, and E-Health as just some examples of how broadband flexibility can be a platform for assistive IP applications. However, like the RERC staff, the NAD observes that the current regulatory structure of broadband is not conducive to this positive outcome.

The most persuasive and immediate arguments are made by the RERC on Telecommunication Access (RERC-TA) in its comments to the FCC on IP-Enabled Services. The RERC-TA

specifically cites areas where the FCC has a need to mandate requirements to the benefit of persons with disabilities. These areas include IP compatibility with TTY services, call signaling for persons who are blind, accessible design of electronic interfaces, and access to emergency services. Other areas of concern are the quality of service protection for text-based services and comparable speech quality over IP services for persons who are deaf or near-deaf.

The RERC-TA also notes the need for the FCC to actively enforce guidelines for User Materials of IP-Enabled Services and the interoperability of competing IP-Enabled Services, citing the relative weakness of market forces and precedents where the FCC or Congress has addressed a market failure in accommodations provided to persons with disabilities.

7. Conclusions

Looking to the future, proposals such as the New Freedom Initiative and the FCC's growing interest in IP-Enabled Services provide indications of future areas that the Federal government may address. The U.S. Congress is also likely to maintain its central role in promoting IT accessibility.

For the private sector, however, awareness of IT accessibility has been most influenced by the Federal government's mandate to comply with Section 508 requirements of the Rehabilitation Act.

Responding to Section 508, industry has been able to assume a leadership role in developing new assistive technologies that incorporate information technology. Industry has also been central in creating a vehicle for businesses to convey to government the accessibility features of products. In the process, IT and AT companies that increasingly rely on ICT are becoming aware of the competitive benefits of design for the widest range of possible users.

References

- 1) Some examples of Congress intervening in the market on behalf of disabled interests include the Hearing Aid Compatibility Act, the Americans With Disabilities Act's requirement for relay services in telecommunications, the Telecommunications Accessibility Enhancement Act and Section 508 of the Rehabilitation Act, and additional requirements placed on telecom carriers through Section 255 of the Telecommunications Act of 1996.
- 2) Comments of the Rehabilitation Engineering Research Center on Telecommunications Access before the FCC on WC Docket No.04-36. In the Matter of IP-Enabled Services, p.19-22.
- 3) "Section 508 At a Glance." Federal IT Accessibility Initiative, May 2001.
- 4) Section 508: Section 508 Standards.
<http://www.section508.gov/index.cfm?FuseAction=Content&ID=12>
- 5) Section 508: Other relevant Laws.
<http://www.section508.gov/index.cfm?FuseAction=Content&ID=21>
- 6) Technology Assessment of the U.S. Assistive Technology Industry. Office of Strategic Industries and Economic Security, U.S. Department of Commerce, February 2003. Agencies supplied R&D figures at the request of the Commerce Department.
- 7) Strategy for the Development and Transfer of Assistive Technology and Universal Design. Report of the Interagency Committee on Disability Research in Response to the Presidential Executive Memorandum of July 25, 2000.
- 8) ATTO: Resources: AT Products Databases.
<http://atto.buffalo.edu/registered/Resources/ATProductDatabases>
- 9) FCC VoIP Solutions Summit: Potential Barriers of IP-Enabled Services Affecting People who are Deaf, Late-Deafened, or Deaf-Blind.
<http://www.fcc.gov/VoIP/ClaudeStout.ppt>
- 10) "Broadband and Americans with Disabilities." National Association of the Deaf. Available online at
<http://www.newmillenniumresearch.org/broadband.html>



David Olive received the B.S.F.S. degree in International Relations from Georgetown University's School of Foreign Service in 1973 and the M.S. degree in International Economics in 1975 from Johns Hopkins University's School of Advanced International Studies. He joined Fujitsu in 1990,

where he advises on business planning, corporate and business development, and public policy issues affecting IT, e-government, telecommunications, and science and technology. He serves on the Board of Directors of the Information Technology Association of America (ITAA) in Washington, D.C.

E-mail: dolive@wdc.fujitsu.com



Jamal Le Blanc received the B.A. degree in Liberal Arts from Centenary College of Louisiana in 1992 and the M.A. degree from Georgetown University in Communications, Culture & Technology (CCT) Program in 2000. He joined Fujitsu in 2002, where he writes on public policy and legal developments and their relevance to IT and telecommunications.

E-mail: jleblanc@wdc.fujitsu.com