Reflections on the Myth of Icarus in the Age of Information

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REFLECTIONS ON THE MYTH OF ICARUS IN THE AGE OF INFORMATION

Allen S. Hammond†

...with melting wax and loosened strings
Sunk hapless Icarus on unfaithful wings;
Headlong he rushed through the affrighted air,
With limbs distorted and dishevelled [sic] hair;
His scattered plumage danced upon the wave,
And sorrowing Nereids decked his watery grave;
O'er his pale corse [sic] their pearly sea-flowers shed,
And strewed with crimson moss his marble bed;
Struck in their coral towers the passing bell,
And wide in the ocean tolled his echoing knell.¹

Whenever man opens a window of power he imagines that he can do so without the careful separations, distinctions, and determinations mandated by the facts of his existence and his mortal limitations; and whenever he does this he suffers a terrible degradation that casts him back even as he imagines himself hurtling forward.²

I. INTRODUCTION

It is economics, policy, law, and indeed, for some, religion that advanced information technology should be eventually accessible to the masses. To this end, the federal and state governments are establishing goals and guidelines for advanced information technology's equitable deployment.³ Chief among the governments’

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1. BULLFINCH'S MYTHOLOGY 158 (1978) (quoting a poem by Darwin).
intended beneficiaries are our children, Generations X, Y, Z, and beyond. The explicit expectation, however, is that every individual and group in our society would benefit from such deployment.

Efficiencies in the computer augmented generation, embedded in the processing and storing of information are expected to enhance education, commerce, the economy, political discourse, individual self actualization, and the management of our homes. Proponents of this utopian technological utility abound. The only difficulty, many argue, is in achieving equitable access in a society in which progress is propelled by profit and hamstrung by the inequitable distribution of wealth.

An equally compelling issue is the unquestioned assumption that technology—as developed, deployed, and currently evolving—is beneficial to all. However, technologies are not neutral in their impact. Even when they are implemented with the most beneficent of intents, they almost always have inadvertent consequences. While many might dismiss this assessment as the lamentation of yet another Luddite, the anthropological and psychological relationship between our tools and us, and especially between us and our communications


5. See Office of the Press Secretary, President Clinton and Vice President Gore, A Record of Leadership in Electronic Government and Technology, M2 PRESSWIRE, Sept. 25, 2000; Testimony Sept. 9, 1999 Gregory L. Rohde Senate Commerce, Science and Transportation FTC Commerce, Nominations Confirmation Hearing, FED. DOCUMENT CLEARING HOUSE, INC., Sept. 9, 1999; Prepared Testimony of Larry Irving Assistant Secretary for Communications and Information National Telecommunications and Information Administration (NTIA), U.S. Department of Commerce Before the House Committee on Commerce Subcommittee on Telecommunications, Trade, and Consumer Protection Subject, Reauthorization of NTIA, FED. NEWS SERVICE, INC., May 11, 1999.

6. See generally Hammond, supra note 4; see Jacobs, supra note 4; see Kennard and Lyle, supra note 4.

7. The real revenge is not what we do intentionally to one another. It is the tendency of the world around us to get even, to twist our cleverness against us. Or is it our unconscious twisting against ourselves. Either way, wherever we turn we face the ironic unintended consequences of mechanical, chemical, biological and medical ingenuity-revenge effects they might be called. See EDWARD TENNER, WHY THINGS BITE BACK: TECHNOLOGY AND THE REVENGE OF UNINTENDED CONSEQUENCES, (Alfred A. Knopf ed., Vintage Books, Random House Inc., New York 1997).
technologies, justify a more careful consideration.

II. THE LIMITS OF TECHNOLOGICAL DETERMINISM

A. The Myth of Technological Utility & Neutrality

1. Print & Dyslexia as Metaphor

Human experience is replete with unintended consequences of a technology's deployment.\(^8\) Communications technologies are not exempt.\(^9\) Print technology, the dominant tool for the storage, transmission, and receipt of information for centuries, has served as an unintended bar to individuals who cannot easily process and translate the sequence of letters and symbols on a page.

Dyslexics and non-dyslexics use different mental pathways to process symbol encoded information.\(^10\) This difference is a matter of biological "wiring," distinct from intelligence.\(^11\) A substantial number of dyslexics possess average or above average intelligence.\(^12\) Yet for at least a century in western societies,\(^13\) such individuals have been deemed deficient, less than mentally competent or aberrant, simply because they do not interface well with the technology.\(^14\)

Even the widespread and growing adoption of computer technology, with all of its current and potential future benefits, brings

\(^8\) See generally id.
\(^9\) For instance, it has been asserted that "the front stoop was one of the centers of social life in Chicago's blue-collar neighborhoods of the early 1950s." However, in the ensuing decade, the introduction of television affected . . . patterns of social interaction as families spent more time in front of a television than talking with one another or their neighbors. The net result [along with the advent of air conditioning] has been the increased atomization in social life as well as the decline of spontaneous neighborhood oversight and discipline of children and increased criminal activity. William A. Galston, Does the Internet Strengthen Community?, 89 NAT'L CIVIC REV. 193, Sept. 22, 2000.
\(^12\) Drake, supra note 10.
with it comparable unintended consequences. The incidence of repetitive stress injuries,\textsuperscript{15} which is increasing among computer users in the workplace, at schools, and in the home, was hardly an intended result of computer technology.\textsuperscript{16}

Proficiency in the tool's use rests at the center of social competence and success. It has come to define in significant part what constitutes a capable human being in western society in the twentieth century. Therefore it should come as no surprise that individuals with dyslexia who find themselves ostracized and adversely mislabeled as unintelligent suffer from feelings of failure

\textsuperscript{15} Repetitive stress injury is the catch-all term used for the tissue damage and functional impairment that can result from repetitive motion. Carpal Tunnel Syndrome, caused by compression of a nerve that passes through the wrist, is the best known, but other repetitive problems include tendentious, back and neck pain, muscle weakness and eye strain. Martin R. Drummond, \textit{Are You Ergonomically Correct?: Repetitive Stress Injuries Are Linked To Computer Keystrokes And Moving Computer Mouses}, PRESS J. (Vero Beach, Fl), Oct. 8, 2000, at D1. Repetitive stress injuries, also referred to as cumulative trauma disorders (CTDs) account for $1 of every $3 spent for workers' compensation. Total costs for CTDs add up to as much as $60 billion per year. Carpal tunnel syndrome cases involve more than 25 days away from work, on average, compared with 17 days for fractures and 20 days for amputations. Workers with severe CTDs can be permanently disabled.


For more information on CTDs, see Theresa A. Cortese, \textit{Cumulative Trauma Disorders: A Hidden Downside To Technological Advancement}, 11 J. CONTEMP. HEALTH L. & POL'Y 479, Spring, 1995.

\textsuperscript{16} A survey of Fortune 500 companies in 2000, discovered that nearly "70 percent of office workers had experienced physical ailments related to computer use. Similarly, the federal Bureau of Labor Statistics (BLS) reported that four of the top 10 categories of jobs causing injury are computer-related." Among those likely to miss work because of repetitive stress syndrome (RSI) are secretaries, data entry keyers and typists. According to BLS reports, five out of nine of the jobs most populated by Carpal Tunnel Syndrome victims, are computer-related. Martin R. Drummond, \textit{Are You Ergonomically Correct?: Repetitive Stress Injuries Are Linked To Computer Keystrokes And Moving Computer Mouses}, PRESS J. (Vero Beach, Fl), Oct. 8, 2000, at D1.

Meanwhile, video game makers include warning labels on their products advising potential players of hand injuries and blisters that may come from rapid movement of a joystick. Scholars warn that widespread use of computers in schools can carry negative consequences if work stations in libraries and classrooms are not set up to accommodate the smaller bodies of children. Carrie Johnson, \textit{Researchers Study Children's PC Use; Clues to Possible Future Injuries Sought}, WASH. POST, May 16, 2001, at G05. See also Diane Daniel, \textit{When Computers Bring Children Pain}, BOSTON GLOBE, May 15, 2001, at C1; and Laura Royster Bradley, \textit{A Healthy Approach to Classroom Computers: Preventing a Generation of Students From Developing Repetitive Strain Injuries}, 80 N.C. L. REV. 275 (2001) (arguing that the current state of in-school computer usage coupled with the potential number of students who may develop RSI's in the future requires national attention similar to the attention OSHA is currently giving to RSI's in the workplace).
and low self esteem, experience emotional and motivational problems, and face a potential diminution in life opportunities.17

Interestingly, dyslexia may have a disproportionate impact on gender and may be culture dependent. Although the incidence of dyslexia is roughly equal in males and females, females are more adept at compensating because they process phonemic information on both sides of their brain while males process such information on only one side of the brain, namely their left brain.18 It is suggested that dyslexics may find it easier to read Chinese for instance, rather than Roman Alphabet-based written languages. Chinese characters are pictorial and have their own meaning while the order of letters in a word composed via use of the Roman alphabet must be correlated to a separate meaning.19

Given these facts, the reliance on print technology as the dominant social tool for storage, transmission, and receipt of information has resulted in the unintended consequence of disadvantaging a significant portion of Western society.20 Historically, this disadvantage has manifested as stigmatization, ostracism, diminished self-esteem, emotional trauma, delinquency, and a lessening of life chances for dyslexics. The choice and deployment of a clearly beneficial tool of communication has had a disproportionate impact on individuals based on gender and may have adverse cultural implications as well.21

17. See also Sally M. Reis, Terry W. Neu, & Joan M. McGuire, Case Studies of High-Ability Students with Learning Disabilities Who Have Achieved, EXCEPTIONAL CHILDREN, Jun. 22, 1997, at 463.
20. It is asserted that
[w]hen English-speaking children with dyslexia begin to read, they face the awesome task of learning more than 1,100 ways that letters in the written language are used to symbolize the 40 sounds in the spoken language. This may explain why there are twice as many identified dyslexics in English-speaking cultures as in countries with less complex languages.
21. An individual capable of attaining cultural literacy in a society in which communications symbols and concepts are conjoined, are rendered potentially incompetent in societies in which communications symbols and concepts require phonemic processing to be understood.
2. Computer Technology and Unintended Consequences: Technology and the Mathematics of Disability

The new technological tools, software-enhanced, computers and networks, rest on the foundation of print but require a new set of proficiencies. Like print before them, there are physical and mental requirements for proficient use. And, as with print, wholesale adoption and deployment of the technologies may result in rendering a whole new class of individuals socially incompetent. These individuals would be labeled deficient for no other reason than their inability utilize a tool which is physically inaccessible to them or which requires the manipulation of language, symbols, and logic processes foreign to or incompatible with the manner in which they process information. Again, it would be highly unlikely that anyone would assert or suggest that such a result was intended, desired, or justified.

The increasingly widespread adoption of the new technologies has already begun to engender adverse social consequences. Many Americans are said to be uncomfortable with technology while a significant number suffer from "technophobia and information overload."

But these discomforts pale in significance when one considers the mathematics of disability. The percentage of the population with a disability grows as the population ages. The 2000 census reported that 49.7 million people in the U.S. aged five and over have some form of disability; this means approximately one in five Americans, or about 19 percent are disabled. According to the census, approximately 5.2 million Americans between the ages of five and 20 are disabled. This constitutes eight percent of the individuals in that age group. Another 30.6 million Americans between the ages of 21 and 64 are disabled. And, 14 million Americans age 65 and over are disabled, comprising 42 percent of the individuals in the oldest age group. Thus, while one can point to the large number of 5-65 year olds who are able-bodied, the long-term prognosis for the

24. Id.
25. Id.
26. Id.
“temporarily-abled” population is not rosy.

If one then adds the number of individuals with learning disabilities, an even starker picture emerges. Students diagnosed with learning disabilities now comprise more than half of all students enrolled in special education programs. This is an increase of 22 percentage points over the past 25 years. In the past decade, the share of students ages 6 to 21 identified as learning disabled under IDEA has increased to 38 percent with the largest increase, (44 percent), among adolescents ages 12 to 17.27

The inability to read places children at substantial social risk. Among the risks are: dropping out of school (35 percent of learning disabled children drop out, twice the rate of peers without learning disabilities) and juvenile delinquency (while approximately 15 percent of Americans have some kind of learning disability, the figure rises to 50 percent among young criminal offenders).28 In summary, our society is composed of individuals who shift between the ranks of the disabled and the temporarily-abled over time. In addition, we are partially comprised of individuals who are learning disabled. When taken as whole, and taking into account the aging of the “baby boomers,” the physically and learning disabled may comprise a majority of society.

In a society increasingly dependent upon computer technology for work, education, information and recreation, the issue of how the rising incidence of disability over time will interact with the rapid deployment of computers and advanced telecommunications networks becomes a threshold question. A few examples of the inadvertent consequences of early computer technology adoption can provide some clues. One might argue that computers and their software programs have already begun to assist in the meaningful instruction of students with cognitive and learning disabilities.29

In the case of computer hardware and software companies’ election of GUIs over text, companies such as Microsoft, Apple and Sun Microsystems are now actively engaged with members of disabled communities to rectify the accessibility problem.30

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30. Amy Kautzman, Virtual Access: Making Web Pages Accessible to People with
computer game and software industries have responded to the existence of an under-served market for social and collaborative games via the entry of new ventures such as the short lived Purple Moon. All of these assertions are true. Nevertheless, the above identified examples of computer-related unintended consequences have had and will continue to have an adverse impact on a significant portion of society. If one accepts the premise that facility with computer augmented communications is becoming a socially required skill, then design decisions, which inadvertently exclude a portion of a potential user market or an existing user group, frustrate the development of the socially required skill, creating innocent incompetents. It is unlikely that the initial decision to develop, adopt and deploy was preceded by any consideration of social impact. Restated, initial decisions are not likely to have considered the tool's availability and utility to all potential users. Computer software and hardware design decisions can inadvertently result in exclusion or harm. And, as a consequence, efforts to assure broad accessibility and minimize adverse impact should be encouraged.

III. THE AGE OF INFORMATION

A. Rethinking Technological Determinism

Take a baby from 150,000 years ago and raise him/her in modern Manhattan. What have you got? You've got a 21st-century kid with in-line skates. Now, take the next kid born now and send


32. A distinction can be made between GUI and video games on the one hand and the Y2K phenomena on the other. The DOS to GUI transition and video game content creation resulted in interface exclusion or content opt out decisions at the point of interaction between the technology and the user. The technology did not fail to function as intended. In the case of Y2K software, the technology will not function as intended at the point of interaction. Nevertheless, it too could result in interface exclusion or content related frustration.
him/her back 150,000 years and what have you got? Some grub-scrounging missing link. Technology is all that matters. "Technology is all that makes us human." 33

At first blush, the above quote seems nothing more than an overstated paean to technological determinism. Nevertheless, there is some truth to it. Our capacity to recreate the world around us consistent with our thoughts is an essential part of our nature as human beings. 34 And, in the twentieth century, our use of technology has expanded and accelerated the possibilities inherent in human existence. 35 The natural rhythms and limitations of our planet and ourselves have a decreasing impact as we remake more of the world with our tools. 36 It is argued, that through this symbiotic, technology-enhanced mediation process, we are augmenting our evolution as well. Human evolution and technological change become inseparable. One pair of technology entrepreneurs has argued that: "Increasingly, the meaningful question may not be whether technology is good or bad, but instead, whether there are substantive differences between the makers and the made." 37

Not only do we use our tools to mediate our relationship with the world, we use them to mediate our relationship with one another. This reliance on mediation is particularly evident in our use of communications technology. 38 At least one expert has argued that our relationship with computers has developed into a "cognitive symbiosis unique in nature." 39 There is much speculation about how

34. "A sustained, focused, and intricately integrated creative outburst on the part of millions of people has redefined the pace and possibilities of human existence in ways previously only dreamed about. Life dominated by natural rhythms and limits has given way to life mediated and liberated by artifacts." Arts & Artifacts: Books Dealing with Man and Technology, REASON, Dec. 1996, at 36, (quoting Brink Lindsey).
35. Id.
36. Id.
39. "What we really need to do...is to understand how inseparable technological change is from human evolution. Technology is us." Arts & Artifacts: Books Dealing with Man and Technology, REASON, Dec., 1996, at 36 (citing Walter Truett Anderson, Merlin Donald and Bruce Mazlish).
becoming electronically wired will affect and transform our society.\textsuperscript{40} Given the growing social utility, increasing societal reliance and potentially critical evolutionary role of communications technology, it is essential that we consider how we create, deploy and use it.

B. Considerations of Technological Impact

To date, many actively engaged in anticipating and assessing information technology's potential impact on society have been science fiction writers\textsuperscript{41} and futurists.\textsuperscript{42} For them, the probable potential impacts of technology are things to be exposed and probed.\textsuperscript{43} Authors Neal Stephenson and William Gibson imagine worlds in which humans are programmable and the distinction between individuals and societies on the one hand and technology on the other is not easily discerned.

Stephenson's tale about the impact of an interactive book built of nanotechnology is inter alia an allegory on the bittersweet utility and unpredictability of relying on technology as the primary tool for educating children.\textsuperscript{44} Stephenson makes a point many educators and policy makers would do well to ponder. The point being made here, however, is not that Stephenson and Gibson are prescient or right,

\begin{itemize}
  \item \textsuperscript{40} Through today's Internet, we already can explore and form communities of interest that aren't constrained by geography...If the Net becomes so much broader and deeper...we could have become a truly global village. And maybe, something more: a new kind of organism. See John Schwartz, \textit{The Site-Seers' Guide to Some Way-Out Internet Futures}, WASH. POST, Jul. 3, 1996, at A1.
  \item \textsuperscript{42} Arts & Artifacts; Books Dealing with Man and Technology, REASON, Dec., 1996, at 36 (quoting Walter Truett Anderson, psychologist Merlin Donald, and technologist Bruce Mazlish).
  \item \textsuperscript{43} One commentator interprets Stephenson to be suggesting that: over time, our group identities—a primary guiding principle of 20th century society—will shift from inherited geographic and ethnic boundaries to those determined by choice and digital reach: online virtual communities. Michael Krantz, \textit{Technology: Modemocracy in Action; Digital Communications Will Empower Consumers, America}, MEDIAWEEK, Nov. 7, 1994, at S28.
  \item \textsuperscript{44} See Neal Stephenson, \textit{The Diamond Age, or A Young Lady's Illustrated Primer} (1995).
\end{itemize}
although in some respects they and their colleagues have been,45 but that they are actively engaged in addressing the question of impact at a level many of our politicians and policy wonks are not.46

IV. HUMAN COMPUTER INTERACTION AND UNIVERSAL DESIGN

Crucial to our understanding of future possibilities is our understanding of the relationship between human functionality,47 technological functionality, and the nature of the engineering enterprise.48 In the area of advanced technology, the pursuit of such an understanding is found in the study of human-computer interaction (HCI).49 HCI "seeks to understand and support human beings interacting with and through technology." It is an area of study and

45. Out there, along time's far horizon, there are electronic realms that might seem more like science fiction than fact. But science fiction has a way of coming true sometimes. Jules Verne took us to the moon a little early. Author William Gibson named a place called "cyberspace" and now many of us all but live there. Sometimes writers and creators of the new world come to the same point simultaneously. Software representations of people interacting on-line, for instance, are part of Electric Communities' game plan—and part of novelist Neal Stephenson's rollicking novel SNOW CRASH.

46. The value of these science fiction novels about our potential technology enhanced futures is that they..."help explain why things could happen in a certain way...[and]...give order and meaning to events—a crucial aspect of understanding future possibilities." PETER SCHWARTZ, ART OF THE LONG VIEW, 37-38 (Doubleday 1991).

47. For instance, human-computer interaction (HCI) study is the region of intersection between psychology and the social sciences, on the one hand, and computer science and technology, on the other. HCI researchers analyze and design specific user interface technologies (e.g. pointing devices). They study and improve the processes of technology development (e.g. task analysis, design rationale). They develop and evaluate new applications of technology (e.g. word processors, digital libraries). HCI is a science of design. It seeks to understand and support human beings interacting with and through technology. Much of the structure of this interaction derives from the technology, and many of the interventions must be made through the design of technology. HCI is not merely applied psychology. It has guided and developed the basic science as much as it has taken direction from it. It illustrates possibilities of psychology as a design science.


48. To understand technology fully, it is necessary to understand the nature of engineering. The formulation and solution of technical engineering problems is, of course, at the heart of every technological endeavor...but dealing with technical problems within the constraints of the laws of nature is only one aspect of the total engineering enterprise. Real engineering in the real world is inextricably complicated by cultural, social, political, economic, and aesthetic goals that shape and in turn are shaped by the technical objectives. Arts & Artifacts: Books Dealing with Man and Technology, REASON, Dec. 1996, at 36, (quoting Henry Petroski).

49. See Carroll, supra note 47.
inquiry, which combines psychology and the social sciences, on the one hand, and computer science and technology, on the other. The majority of HCI research has addressed the "usability" of computer systems and applications.

Recently, HCI has focused on evolving away from what one commentator has called "ugliness in software." Ugliness in software occurs when "layers of software (legacy systems) become locked in place when new layers refer to them, and ugliness from lower levels percolate upward." Several commentators have noted that the tendency of many software engineers is to focus on technology, rather than on the characteristics of the humans that will use the technology. They are subject to a figure/ground illusion in which the computer is the center and the user is the peripheral. These kinds of disconnections from reality bring computer ugliness into being. When software design decisions are made exclusive of human needs and concerns and only in reference to themselves, the result is a self-referential bundle of nonsense suspended by a sky hook. Computers do not function or exist independent of humanity, rather they are cultural artifacts, like language, intelligible only to those who know them.

A. Human Computer Interaction Research (HCI)

Human Computer Interaction is the study of the interaction between the human user and the computer at the interface. The interface is the boundary between the two where the user and computer make contact, interact and communicate. The interface consists of all the parts involved in communication between the computer and the user, including such devices as keyboards, displays,
and software.\textsuperscript{57} HCI also includes the study of human interaction with computer hardware and software input devices in an effort to develop refined devices that take advantage of the physical and mental traits of the user to facilitate efficient user input.\textsuperscript{58} Typical input devices include the mouse, keyboards, joysticks, touch-screens, scanners, trackballs, and cursor keys. In addition, HCI research evaluates output devices or mechanisms based on how well the computer presents information and/or responds to the user. Typical output devices include monitors, printers, and speakers. Information can be presented in the form of text, graphics, movement, or sound and in color or monochrome.

HCI seeks to match users’ concepts of the task, job or goal they seek to accomplish with the concept of the task placed in the computer by its designer.\textsuperscript{59} HCI researchers aim to determine how to make the user’s model of the task coincide with the model built into the computer by its designers. Another area of HCI research examines task fit to determine how well the computer provides the user with the functions and information that is needed.

HCI is also concerned with identifying user needs via assessing computer design and development, as well as the computer’s impact on the user.\textsuperscript{60} In impact research, the goal is to discover design and implementation methods that minimize the potential negative impacts of interaction while maximizing the computer’s utility. Potential areas of impact include: developing compatible language, equating conceptualization of task, facilitating the ability to achieve pragmatic meaning between human and machine, and equating designer and user conceptualizations of the computer system to achieve computer utility.\textsuperscript{61}

One significant set of HCI findings concerns the differences in the manner in which humans communicate with one another and the manner in which they communicate with computers. First, humans communicate with one another via speaking and gestures, while humans communicate with computers via typing. Second, humans

\textsuperscript{57} See Thomas Hewitt et. al, ACM SIGHCI, \textit{Curricula for Human-Computer Interaction}, at ch. 2.1, \textit{available at} \url{http://www.sigchi.org/cdg/index.html} (last modified Dec. 6, 2002).

\textsuperscript{58} See HANDBOOK OF HUMAN COMPUTER INTERACTION, \textit{supra} note 56, at 49.

\textsuperscript{59} \textit{Id.} at 87.

\textsuperscript{60} \textit{Id.}

\textsuperscript{61} Gary M. Church, \textit{The Human-Computer Interface And Information Literacy: Some Basics And Beyond: The Technology of Information Literacy}, 18 INFO. TECH. AND LIBR., Mar. 1, 1999, at 3.
communicate via ordinary speech, while human-computer interaction requires an abstract, less intuitive, and frequently illogical language or group of commands. Third, humans frequently communicate with imperfect grammar while computers communicate in an unforgiving, grammatically correct language. Finally, while humans are frequently able to clarify meanings to reach a common understanding of each other’s messages, such clarification is usually not possible in human-computer interactions.

In response to this potential dialogue and understanding disconnect, HCI research attempts to support the development of new devices and interaction styles that take advantage of the respective strengths of humans and computers to build new mechanisms and languages for human-computer interaction and collaboration. Efforts to improve human-computer dialogue include: improvements in input and output devices to better connect the physical and mental traits of the user, creating computer systems capable of processing inputs and responding in human speech, and developing processes to facilitate clarification of meaning and the development of common understandings between user and computer.

Another critical area of HCI research concerns the study of the cognitive process engaged by the user and the computer. When the user interacts with the computer, he or she is actually interacting with the information, program logic, and knowledge of another intelligence. This research encompasses efforts to match user and computer designer concepts of computer utility and tasks to be jointly performed by user and machine, as well as efforts to enable the user and the computer to arrive at a pragmatic understanding during the interaction.

Inherent in the scope of HCI research is the recognition that computer systems remain deficient in some critical aspects. Often times, computer systems do not adequately communicate with the user. Computer systems are also often poorly designed, and poor interface design negatively impacts computer system performance. Specifically, poorly designed interfaces can lead to lower user productivity, frustration, fear, insecurity, and stress.

One of the crucial qualifiers on human-computer interaction is

63. See HANDBOOK OF HUMAN COMPUTER INTERACTION, supra note 56, at 49.
64. Id. at 489.
culture. Culture is an integral, piece of an individual's mode of interaction with the world. Culture is a shared conscious and often subconscious blueprint for a social group's way of life. It is the articulation of a group's distinctiveness as compared to others in the society. Culture consists of the learned collective values, sense of self and aspirations of social groups and those of its individual members. Culture also includes the tools and trappings used in peoples' daily lives. As such, cultural notions of relevance and usage are recognized as playing an important role in product choice, usage and resistance.  

Language is the primary medium for communicating culture. Thus, the words used to describe behaviors, beliefs and environment are often dependent on their cultural roots. It is suggested that language has a profound impact upon shaping our perception. What we see is actually guided by our method of attaching meaning to things, which in turn are circumscribed by cultural patterns. For instance, English has only a few words for describing snow, while Inuit languages have a wider and richer vocabulary since snowfall is a much greater component of Inuit daily cultural experience.

However, language is not always well adapted for the task. It is too linear and limited in its descriptive vocabulary, and constrained by its own evolution. To compensate for the limitations of language, we use culturally-based patterns of non-verbal communication. Non-verbal adjuncts include facial and body gestures, voice manipulation, or the use of inter-personal space and time. As such, one must be aware of non-verbal communication in

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65. Hy Mariampolski, The Power of Ethnography: Qualitative Research For The 21st Century, 41 J. MARKET RES. SOC'y, at 75, Jan. 1, 1999. Product designers and marketers recognize that many purchasers select products because of their perceived utility. For example, the first Apple computer was designed to communicate ease of use. See Peter H. Bloch, Seeking the Ideal Form: Product Design and Consumer Response, J. MARKETING, (Summer 1995), at 16.

66. See id.

67. See id. For instance, it has been noted that unlike English, the French language does not allow users to distinguish between house and home, or mind and brain, or man and gentleman, or between "I wrote" and "I have written." There are no native words in Russian for efficiency, challenge, engagement ring, have fun, or take care. Unlike French and German, however, English, has no equivalent word for knowledge that results from recognition (connaitre and kennen) or for knowledge that results from understanding (savoir and wissen). BILL BRYSON, THE MOTHER TONGUE: ENGLISH AND HOW IT GOT THAT WAY 13-20 (1990).

68. See Mariampolski, supra note 65.

69. For instance, speakers from the Mediterranean region like to be relatively close to the person they are addressing while northern Europeans prefer more distance. Modern Greek language has in excess of seventy common gestures. It is estimated that the human anatomy facilitates the making of as many as 700,000 different gestures. See Bryson, supra note 67, at 36-37.
order to successfully decode cultural meaning.\textsuperscript{70}

Given the pervasive nature of culture and the limited utility of language and its articulation, cultural differences between user and computer designer can adversely affect efforts to harmonize designer and user concepts of the computer and/or network system and the tasks to be performed.\textsuperscript{71} Culture can also compromise the utility of language used to facilitate user input and interaction with the computer, as well as the cognitive processes by which users and computers engage in reaching pragmatic meaning.

Human computer dialogue involves the exchange of meaningful symbols and requires at least partially overlapping fields of experience.\textsuperscript{72} Without the exchange, no meaningful communication occurs.\textsuperscript{73} Both parties, human and computer, must be able to decode (understand) the symbols in the other party's message to acquire meaning. A disconnect in cultures between designer and user which manifests as a disconnection in the language used by computer and user results in ineffective decoding of meaning whether through a failure of literal interpretation (semantic) or of overall context (pragmatic).\textsuperscript{74}

The chances of such a disconnect is significant. Researchers have found that technology users tend to attribute human social behaviors to the technology's actions. This tendency to engage in anthropomorphism leads to user frustration because the machine is then expected to manifest an array of social behaviors expected of humans.\textsuperscript{75} This array of social behaviors is inherently cultural.\textsuperscript{76}

Clearly, there are potential downside risks to our establishment

\textsuperscript{70} Id.
\textsuperscript{71} For instance, it has been noted that
[a] frequent concern by some human-computer interaction researchers about anthropomorphic human-computer dialogues is that early in the interaction, users are likely to assume the system has greater abilities than it actually has, and therefore attempt to speak in a manner the system has little probability of understanding... The basic problem is that if the system sounds too much like a human, users can reasonably expect it to understand like a human, a feat machines are not yet capable of.


\textsuperscript{72} See Church, supra note 61.
\textsuperscript{73} Id.
\textsuperscript{74} Id.


\textsuperscript{76} See Mariampolski, supra note 65.
of computer literacy as a social definition of competence. Computers may be created with only the designer's cultural and language biases, utilitarian conceptualizations and notions of the user in mind. 77 Consequently, the designer's conceptualization of the computer model and user tasks to be performed may fail to take into account the user models and tasks of those falling outside the designer's cultural frame of reference. 78 As such, the software may contain unexplored or unanalyzed assumptions about how users communicate, think, process information or feel about the information presented. The computer technology may also possess an inadequate conceptualization of users' capabilities and/or limitations. The transition from DOS-based to GUI-based interaction on the Web is a case in point.

Computers may also be created without sufficient knowledge of how the user perceives the utility of the technology and consequently, how they will interact with it. The computer may be created without acknowledgment of human needs or scale of interaction. That is, it may be created solely with reference to preexisting technology, which would miss various necessary utilitarian elements of functionality. This in turn could lead to the problem of "ugliness." 79 The computer as designed may also frustrate a user’s cultural and/or social expectations about the machine or software.

Given the societal designation of computer literacy as a pivotal factor of social competence, the existence of so many opportunities for a disconnect between computer designer and computer user necessitates a far more careful and critical analysis of computer impact and utility. There cannot be a more fortuitous moment to begin the analysis.

78. For example,

[The standard metaphor for human-computer interaction has focused heavily on the paradigm of the white-collar office worker. The typical GUI represents the structure of the interface as an office desktop, with files, documents, and actions based on typical office behavior (dragging a file into a trash can to delete it, or double clicking on a printer icon to print a document). This is all well and good for those applications, such as document processing, that are representative of the actual work that takes place within the real-world office environment. However, the 'virtual office' on the computer screen becomes less useful as the computing environment is adapted to less similar environments. . .]

Id.

79. See Jaron Lanier, supra note 52.
B. Universal Design

How should the analysis of impact and utility proceed? Perhaps a good start would be an effort to merge the increasingly human orientation of HCI with the relevant principles of universal design.

It has been suggested that in order for new technologies to be "...more flexible and robust enough to offer a broader spectrum of sensory, physical, and cognitive capabilities right out of the box," universal design principles should be adopted.\textsuperscript{80} The principles of Universal Design (UD) have as a chief goal "the design of products and environments...usable to all people, to the greatest extent possible, without need for adaptation or specialized design."\textsuperscript{81} In particular, seven principles have been identified. They are:

1. Equitable Use: design is useful and marketable to people with diverse abilities;
2. Flexibility in Use: design accommodates a wide range of individual preferences and abilities;
3. Simple and Intuitive Use: design is easy to understand regardless of the user's knowledge, language skills, or current concentration level;
4. Perceptible Information: design communicates necessary information effectively to the user regardless of ambient conditions or the user's sensory abilities;
5. Tolerance for Error: design minimizes hazards and the adverse consequences of accidental or unintended actions;
6. Low Physical Effort: design can be used efficiently and comfortably and with minimum fatigue; and
7. Size and Space for Approach and Use: design incorporates appropriate size and provides appropriate space for approach, reach, manipulation and use regardless of the user's body size, posture or mobility.\textsuperscript{82}

Upon comparison and analysis, arguably, it may be concluded that UD's principles can provide a complimentary amplification of HCI's goals. HCI's goal of enhancing the utility of computers in providing users with the requisite functions and information appears to mesh with several principles of UD. Creating computers which


\textsuperscript{82} \textit{Id}. 
facilitate flexible, simple, and intuitive use by users, and which effectively communicate the necessary information to users regardless of ambient conditions or the users' sensory abilities would seem to best achieve the goal of a truly utilitarian tool.\[^{83}\] Creating a computer design that minimizes the hazards and the adverse consequences of accidental or unintended user actions, while minimizing user fatigue and transcending the varying physical limitations of users, would most certainly be considered utilitarian.\[^{84}\]

There are other areas in which the adoption of UD principles would require an expansion of HCI goals. For example, HCI seeks to establish task and model fit by seeking to match users' and a computer designer's concepts of task and computer model functionality. The manner in which the goals are articulated assumes the user already has some notion of what a computer is and what its capabilities and utility might be.\[^{85}\] Further, it assumes the user possesses some understanding of what the task is and how it is to be accomplished with the computer. These goals are understandably narrowly focused on the tool and the tasks to be done.\[^{86}\] However, if the goal of utility is also narrowly focused, designers run the risk of ignoring the necessity to expand the definition of user to include those who lack computer proficiency. It may exclude a host of users seeking to accomplish multiple tasks on a computer, which are consistent with their personal preferences as well as their physical and cultural characteristics. By contrast, the goals of task and model fit can be recast as potentially rich requirements to acknowledge, accommodate and incorporate users' concepts of computer and task. In particular, it can address such users' notions as an amalgamation of users' culturally defined and filtered perceptions of their ability, knowledge and preferences.\[^{87}\]

It is within this context that HCI's goal of minimizing the potential negative impacts of human computer interaction while

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\[^{83}\] Id. HCI's goal of Utility encompasses aspects of UD's principles of Flexibility in Use; Simple and Intuitive Use; Perceptible Information; Low Physical Effort; and Ergonomics [Size and Space for Approach and Use].

\[^{84}\] Id.

\[^{85}\] See Whitney Quesenbery, on Beyond Help: Meeting User Needs For Useful Online Information Technical Communication, May 1, 2001, at 182; David M. Hilbert, David F. Redmiles, Extracting Usability Information From User Interface Events, 32 ACM COMPUTING SURVEYS, Dec. 1, 2000, at 384; Church, supra note 61, at 3.


maximizing the computer’s utility becomes exceedingly crucial. The development of compatible language, the achievement of multicultural and universally “human” task fit, and the achievement of pragmatic meaning between human and computer are essential in order to align designer and user concepts of the computer to achieve true computer utility. Not surprisingly, this HCI goal comports with that of UD’s equitable use vision.

C. Ergonomics

Another related area discipline supporting efforts to harmonize designer and user concepts of computer utility is ergonomics. The word ergonomics is derived from the Greek words ergon (work) and nomos (law). Ergonomics is broadly defined as “the matching of the physical, physiological, and psychological capabilities of the human worker with the physical, physiological, and psychological requirements of the task being performed.” 88 Those pursuing the discipline of ergonomics seek to design tools and tasks that are compatible with human capabilities and limitations. The discipline of ergonomics is used to help solve problems related to the promotion of safety, health, comfort, and efficiency through the design of furniture, equipment, and tasks such that they are suited to the people who use the furniture and equipment or perform the tasks. 89 Ergonomics is used in the physical structure and navigation design of computers. In practice, ergonomists seek to design the task first and then to design the machine, thereby creating a tool that is easier to use while reducing injury and discomfort to users. 90

An essential tenet of ergonomics is that people are different from one another and do not require all of the same equipment specifications. The failure to account for the differences in people by adhering to a “one size fits all” policy based on individuals without disabilities is likely to contribute to the physical stress of some users. 91 It will also exclude others. What ergonomists seek to do is to build responsive flexibility into the tool based on an understanding of the variety of individuals that are likely to be using it. 92

Ergonomic technology is often synonymous with assistive, or

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89. Id.
90. Id.
91. Id.
92. See id. (explaining some of the central tenets of ergonomics).
adaptive technology. The hardware and software that renders the workplace more convenient and safer for all workers can be used to make computers accessible to disabled users. In many instances, the difference between ergonomic and assistive technologies is determined by the reason for their use.\textsuperscript{93}

To the extent that the discipline of ergonomics and design orientation of HCI research moves away from computer system designs that are system or designer centered and toward designs that are user-centered, HCI's design orientation is likely to become more aligned with the goal of UD. Simply put, the aim of UD is: the design of products and environments usable by all to the greatest extent possible, without the need for later adaptation or specialized design.

However, in an endeavor as complex as the interaction between humanity and computers, the achievement of such a goal is no simple task. First, the needs of users vary significantly in their physical, processing, language and cultural characteristics. A software program may benefit one subset of users while being useless to another.\textsuperscript{94} Widespread adoption of a beneficial technology for one subset of users may prove detrimental to another subset of users.\textsuperscript{95} Given such considerations, the role of impact assessment at the conceptualization, creation, deployment and adoption phases of computer augmented telecommunications equipment or service development is critical. The adoption and incorporation of UD principles as well as human computer interaction and ergonomic goals into the design and development of telecommunications equipment and services is still insufficient if they exclude an active, ongoing assessment of impact.


A specially shaped keyboard required by a user with a repetitive stress injury (RSI) is adaptive technology, according to the Americans with Disabilities Act and Section 508 of the Rehabilitation Act Amendments of 1998. That same keyboard given to someone who uses it frequently at work would be considered ergonomic because it makes working easier and users can be potentially more productive. At the same time, it might help prevent users from incurring an RSI.


\textsuperscript{95} Id.
V. PROPOSAL: CREATING ALTERNATIVES: FUTURE FEDERAL
EFFORTS TO FACILITATE ACCESSIBILITY

It is estimated that in excess of fifty-four million Americans
(roughly 20% of American society) possess some form of disability.96
The Americans with Disabilities Act (ADA) defines a disability as:
(1) a physical or mental impairment that substantially limits one or
more of the major life activities of an individual; (2) having a record
of such an impairment; or (3) being regarded as having such an
impairment.97 An individual is deemed to be substantially limited in a
major life activity if she cannot perform or is substantially restricted
in the condition, manner, or duration of her ability to perform such
activities in comparison to the general population. Such activities
include among others: caring for oneself, performing manual tasks,
walking, seeing, hearing, speaking, breathing, learning, and
working.98

Many individuals with disabilities face significant challenges
when attempting to access telecommunications and Internet
information via equipment, services and Internet sites designed for
users with normal vision, hearing, mental acuity, and muscular
control.99 For example, individuals with disabilities may find it
difficult to use a Web site because they cannot: (1) rely on color cues,
(2) read 10-point fonts since the font is too small, (3) hear sounds that
indicate when a mistake has been made or provide critical
information unavailable in text form, or (4) do not possess enough
fine motor control to activate screen targets easily with a mouse.100

96. See In the Matter of Implementation of Sections 255 and 251(a)(2) of the
Communications Act of 1934, as Enacted by the Telecommunications Act of 1996; Access to
Telecommunications Service, Telecommunications Equipment and Customer Premises
Equipment by Persons with Disabilities, (WT Docket No. 96-198) 16 FCC Rcd 6417 (1999); 17
Comm. Reg. (P & F) 837 (1999), ¶ 2. A disability is legally defined as “a physical or mental
impairment that limits a person from a major life activity.” Some people are born with
disabilities, others acquire them as they age or as a result of a disease or injury. Some
disabilities are temporary and others permanent. Barbara T. Mates, Accessibility Guidelines for
99. Donald R. Ballman, Practice Tip Sec. 508 Serves Notice on ‘Inaccessible’
Commercial Web Sites, E-COMMERCE L. & STRATEGY, Apr. 2002, at 1. See also Eva Kaplan-
Leiserson, The Tremendous Issues of Technology: Disabled Persons and Technology, TRAINING
& DEV., Nov. 1, 2001, at 28; and Carrie Johnson, A More Accessible Web; Companies Assist
Acuties in Making Sites Disability-Friendly, WASH. POST, Aug. 21, 2001, at E01.
100. See Ballman, supra note 99. See also Kaplan-Leiserson, supra note 99.
We all know the frustration of a Webpage that won’t load, a document that won’t
download, or an email that won’t open. For millions of people with disabilities,
To date, federal government efforts to facilitate the development of assistive technologies in communications and to encourage the adoption of universal design principles has centered on assuring access to effective communication and information technology for Americans possessing disabilities as identified in legislation such as § 255 of the Telecommunications Act of 1996, § 508 of the Workforce Investment Act of 1998, the Americans with Disabilities Act (ADA), and the Assistive Technology Act of 1998.

Sections 255 and 251(a)(2) of the Communications Act of 1934 (Comm. Act), as amended, establish the accessibility requirements for equipment and software used to connect to or to provision telecommunications networks. Section § 508 of the Workforce Investment Act of 1998 delineates the accessibility requirements for equipment and software used by federal employees to access federal government networks, Web sites and databases. This section also establishes the accessibility requirements for government Web sites and databases providing information to the American public. It is argued that the ADA may establish the accessibility requirements for private Web sites, portals, and databases made available to the public.

those simple tasks that most of us do daily, usually without thought, can be sources of great frustration each time they attempt to complete them. Visual, hearing, motor, and cognitive impairments make it difficult to access and use standard technology.

Id.


104. The purposes of the bill include: support of state efforts to address the assistive technology needs of individuals with disabilities; focus investment in technology that could benefit individuals with disabilities across federal agencies and departments; and support micro-loan programs to provide assistance to individuals seeking to purchase assistive technology. See Senate Committee Approves Assistive Technology Legislation, 14 SPECIAL EDUCATOR, Sept. 25, 1998.


A. Sections 255 and 251(a)(2) of the Communications Act of 1934

Congress has acknowledged that the disabled cannot access many of the telecommunications products and services that are essential for full participation in society. Sections 255 and 251(a)(2) of the Act were passed to extend the benefits of the telecommunications utility and efficiency to all, including those experiencing accessibility barriers to telecommunications products and services. Sections 255 and 251(a)(2) of the Communications Act of 1934 require manufacturers of telecommunications equipment and providers of telecommunications services to ensure that their equipment and services are accessible to persons with disabilities, "if readily achievable."\textsuperscript{107} Through their applicability to manufacturers and service providers, §§ 255 and 251(a)(2) focus on the accessibility of equipment used to connect to the network, the accessibility of the network itself, and the accessibility of telecommunications services by providers of such services.

Specifically, § 255(b) requires that manufacturers of telecommunications equipment or customer premises equipment (CPE) must ensure that their equipment is designed, developed, and manufactured to be accessible to and usable by individuals with disabilities.\textsuperscript{108} Similarly, § 255(c) also mandates that telecommunications service providers verify that their services are accessible to and usable by individuals with disabilities. And, whenever accessibility requirements are not readily achievable under §§ 255(b) and (c), § 255(d) requires manufacturers and service providers to ensure compatibility with existing peripheral devices or specialized CPE commonly used by individuals with disabilities to achieve access. Finally, under § 251(a)(2), telecommunications carriers are prohibited from installing network features, functions, or capabilities that fail to comply with the requirements of § 255 or § 251(a)(2).

The Federal Communications Commission recently adopted rules and policies to implement § 255 and § 251(a)(2) of the Communications Act of 1934.\textsuperscript{109} In its announcement of this action,
the FCC acknowledged by analogy, the importance of UD when it stated: “Just as people without disabilities benefit from the universal UD in the ADA...many people without disabilities will also benefit from accessible telecommunications equipment and services.”

While the FCC does not appear to have required that manufacturers and service providers adopt UD principles as part of their compliance strategies, at least one former FCC official has publicly emphasized the competitive efficacy, social utility, and regulatory prudence of such a strategy.

In its Disability Report & Order, the Federal Communications Commission (FCC) held that § 255 is applicable to “the design and production of each individual product and service offered by a manufacturer or service provider.” In particular, the manufacturer and service providers have a continuing obligation to review the accessibility of their product and services and to incorporate accessibility features therein whenever readily achievable.

The FCC also interpreted § 255 to require that accessibility features that can be readily incorporated into a product’s design be deployed in all such products. Where accessibility features or actions cannot be universally deployed in all of a manufacturer’s products or service provider’s services, the producers may selectively deploy them. But producers must deploy the features and actions when readily achievable. The FCC also determined that pursuant to § 251(a)(2), a telecommunications carrier may not install network features, functions, or capabilities that do not comply with its accessibility requirements promulgated pursuant to § 255 and § 251(a)(2).

There is no private right of action under § 255. Only the FCC has jurisdiction to enforce the provisions. The FCC adopted

New Millennium, Federal Department and Agency Documents, July 14, 1999.
110. Id.
113. Section 255(f) provides that “nothing in this section shall be construed to authorize any private right of action to enforce any requirement of this section or any regulation thereunder. The Commission shall have exclusive jurisdiction with respect to any complaint
extensive informal and formal complaint procedures to serve as its enforcement mechanism.\textsuperscript{114} It also adopted the bifurcated complaint procedure so that consumers would have an absolute right to have their accessibility concerns addressed in a timely manner by the manufacturer or service provider concerned. At the same time, the process would encourage the pursuit of settlement before initiating costly and time consuming formal adjudicatory proceedings.\textsuperscript{115}

Under this informal procedure, manufacturers and service providers must try to resolve customer concerns and respond to the Commission within 30 days. They are not required to submit a detailed explanation of what is or is not readily achievable upon the receipt of a complaint. However, the Commission may, "based on a single complaint or a trend or pattern of practices, initiate inquiries or investigations to determine if a manufacturer is fulfilling its §255 obligations."\textsuperscript{116} Consumers are encouraged but not required to contact the alleged non-compliant manufacturer or service provider prior to filing an informal complaint with the FCC. Complainants are allowed to file a formal complaint with the FCC for adjudication of a dispute at any time. However, the FCC requires that both "the complainant and defendant producer certify, as part of the complaint and answer respectively, that they discussed, or attempted in good faith to discuss, the possibility of settlement with the opposing party prior to filing of the complaint."\textsuperscript{117}

The FCC distinguished between enforcement sanctions available to be imposed on common carriers and those available to be imposed on manufacturers and service providers. Common carriers are subject to damages awards for violations of § 255 in the same manner as they are for any other Title II violations. The FCC agreed that it could employ the full range of sanctions and remedies available to it under the Act in enforcing § 255. However, the FCC declined an opportunity to identify the variety of sanctions and remedies it might employ to address manufacturer and service provider violations of § 255. Instead, it indicated that it would use discretion to tailor

\textsuperscript{114} See Report and Order and Further Notice of Inquiry in the Matter of Implementation of Sections 255 and 251(a)(2) of the Communications Act of 1934, supra note 104, at ¶¶ 109–172.

\textsuperscript{115} Id. at ¶¶ 119–120.


\textsuperscript{117} Id.
sanctions or remedies to the individual circumstances of a particular violation.

In short, telecommunications equipment and/or CPE manufacturers must produce accessible equipment and software. Telecommunications service providers are required to produce accessible services, provided such production is readily achievable. Furthermore, telecommunications carriers have a duty not to install non-compliant features, functions, or capabilities. Equipment that provisions the telecommunications network as well as equipment attached to the network and the services made available over the equipment or networks must be accessible. These requirements are enforced by the FCC through a bifurcated process which encompasses informal and formal complaints filed by any interested party.

Such requirements and enforcement procedures would seem to cover many eventualities encountered by individuals with disabilities. Any new telecommunications equipment or services as well as the networks they provision or to which they attach or on which they run, must be accessible. And, if new equipment and services cannot be readily produced in the short term, existing equipment and services must be made compatible with the peripheral devices or specialized CPE commonly used by individuals with disabilities to achieve access, if readily achievable.

However, there are at least two potential difficulties with the current requirements. First, the case-by-case determination of what is "readily achievable" may provide substantial leeway for non-compliance thereby slowing the process of producing and deploying accessible telecommunications technology. Second, the FCC is currently considering whether to adopt a policy of defining broadband technology and services as "non-telecommunications." Should the

118. 47 C.F.R. § 6.3(g)(Part 6)(B) defines readily achievable as: "easily accomplishable and able to be carried out without much difficulty or expense." The rule also identifies the factors to be considered in making the determination of whether a manufacturer or service provider may readily achieve deployment of an accessible feature or action. They include: (1) the nature and cost of the action needed; (2) the overall financial resources of the manufacturer or service provider involved in the action (the covered entity); the number of persons employed by such manufacturer or service provider; the effect on expenses and resources, or the impact otherwise of such action upon the operations of the manufacturer or service provider; (3) If applicable, the overall financial resources of the parent of the entity; the overall size of the business of the parent entity with respect to the number of its employees; the number, type, and location of its facilities; and (4) If applicable, the type of operation or operations of the covered entity, including the composition, structure and functions of the workforce of such entity; and the geographic separateness, administrative or fiscal relationship of the covered entity in question to the parent entity. Id.
FCC succeed in its redefinition, the producers of broadband and advanced networks and services would be exempt from the requirements of §§255 and 251(a)(2). Such a result would be extremely detrimental to the long-term needs of Americans with disabilities.

B. What is Readily Achievable?

In its § 255 Report, the FCC defined the term "readily achievable" to mean: "easily accomplishable and able to be carried out without much difficulty or expense." The FCC elected to determine what is "readily achievable" on a case-by-case basis "considering factors which include: (1) the cost of the action; (2) the nature of the action; and (3) the overall resources available to the entity." Thus the determination of what is readily achievable is chiefly an assessment of a producer's economic viability in the marketplace. Such an assessment necessarily raises questions about the ultimate scope of the Commission’s inquiry into a company’s production capability and plans. Moreover, any assessment by the Commission will be qualified by its perceptions of the economic climate in which the producers must perform.

For instance, telecommunications software and equipment manufacturers and telecommunications service providers are currently in the throes of a full blown "economic downturn." To

120. Id.

"The widespread deployment of broadband services...is perceived as imperative to boost market recovery, e-commerce and ultimately economic productivity." Kate Whittington, Broadband Takes Centre Stage: Tauzin-Dingell Bill Passes House of Representatives, WORLD MARKETS ANALYSIS, Feb. 28, 2002.

Analysts [have] observed that there has been a recent slowdown in [information] technology investments caused by the economic downturn generally and, more particularly, over-building by carriers, over-manufacturing by vendors, and over-capitalization by financial markets, coupled with unrealistic market expectations by investors. They conclude that, although it will take some time for the industry to absorb excess bandwidth capacity and increase utilization of existing assets, the recent slowdown in investment has not been caused by a slowdown in consumer demand. In addition, they conclude that the current contraction in the competitive Local Exchange Carrier (LEC) market, in particular, will likely continue in the near term because the economic opportunity for targeting small-to-medium business markets as an entry strategy, which is where competitive
what extent should the FCC require companies to fulfill their obligations under § 255 and § 251 at a time when substantial portions of the software, equipment and carrier industry segments appear economically vulnerable? Yet a decision to forbear from enforcement due to current economic circumstances will necessarily result in fewer Americans with disabilities being provided with accessible equipment, services and networks because less of it will be required to be produced. Under such circumstances, the digital divide between Americans that are temporarily enabled and those currently disabled would not lessen, and indeed might actually grow.\(^{122}\)

**C. What is Telecommunications?**

In its Notice of Inquiry (NOI) attached to its Disabilities Report & Order, the Kennard FCC recognized the evolving nature of communications technologies and the corresponding necessity to assure that these technologies are accessible to all. It is noteworthy that the Commission, acknowledging the need for more information about the specific nature and pace of technological change and its implications for individuals with disabilities, issued the NOI inviting comment. While the Commission cast its inquiry broadly, it specifically sought comment on “Internet telephony and computer-based equipment that replicates telecommunications functionality.”\(^{123}\)

In particular, the commission asked for comment upon “the extent to which Internet telephony has begun, to replace the traditional telecommunications services, including usage patterns by persons with disabilities,”\(^{124}\) and “the impact of computer based applications that provide telecommunications functionalities further into a customer’s premise than the point of connection with the public

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\(^{122}\) This scenario is not farfetched. The FCC is currently considering the extent to which it may deregulate broadband communications in significant measure because it perceives broadband network service providers to be economically vulnerable. Historically, when the Commission has perceived an industry segment as vulnerable, it has often responded by reducing the regulatory burden on that segment to reduce its cost of doing business.

\(^{123}\) Report and Order and Further Notice of Inquiry in the Matter of Implementation of Sections 255 and 251(a)(2) of the Communications Act of 1934, supra note 112, at ¶ 175.

\(^{124}\) Id.
network.\textsuperscript{125} It also requested comment on the extent to which government regulation will be necessary to ensure accessibility of communications technology in the future.\textsuperscript{126}

Three years later, broadband networks are being used to transport video, voice and data information.\textsuperscript{127} As a result, they are beginning to replace the functionality of the telephone and cable television networks upon which they are constructed.\textsuperscript{128} Many market and industry observers as well as government officials anticipate that broadband communications will become the essential and preferred mode of communications in the nation.\textsuperscript{129} Currently, cable television and telephone networks provide access to cable modem and DSL services respectively to a growing portion of the United States.\textsuperscript{130}

The FCC has recently issued Notices of Proposed Rulemakings and a Declaratory Ruling requesting comment on whether it should

\begin{itemize}
\item \textsuperscript{125} Id.
\item \textsuperscript{126} Id. at ¶ 174–185
\end{itemize}
situate broadband network and service regulation under Title I and remove it from Title II (common carrier) and Title VI (cable television) regulation.\textsuperscript{131} While a public policy discussion of the competing concerns raised in those ongoing proceedings is beyond the scope of this Article, the impact of their resolution could be profound if the FCC is successful in moving broadband regulation to Title I.\textsuperscript{132} First, a decision that broadband networks and services provided over telephone networks are not telecommunications effectively removes telephone based broadband networks and services from the requirements of § 255; second, a decision that broadband networks and services provided over cable systems are not telecommunications effectively avoids applying § 255 to cable TV based broadband networks and service.\textsuperscript{133}

The term "electronic government" (e-government) denotes the use of technology to deliver government information and services to citizens, businesses, employees, agencies and other governments.\textsuperscript{134} In the year 2000, federal government agencies identified 1,371 electronic government initiatives they had undertaken.\textsuperscript{135} According to the National Association of State Chief Information Officers,

\begin{itemize}
\item \textsuperscript{131} In the Matter of Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities; Internet Over Cable Declaratory Ruling; Appropriate Regulatory Treatment for Broadband Access To The Internet Over Cable Facilities Notice of Proposed Rulemaking, GN Docket No. 00-185; CS Docket No. 02-52, 17 FCC Rcd 4798 (2002); and In the Matter of Inquiry Concerning Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities, Universal Service Obligations of Broadband Providers, CC Docket No. 02-33, Notice of Proposed Rulemaking (WIRELINE BROADBAND NPRM) (2002) at P3.
\item \textsuperscript{132} Id.
\item \textsuperscript{133} The Commission concluded that "cable modem service, as it is currently offered, is properly classified as an interstate information service, not as a cable service, and that there is no separate offering of telecommunications service." In the Matter of Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities; Internet Over Cable Declaratory Ruling; Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities Notice of Proposed Rulemaking, GN Docket No. 00-185; CS Docket No. 02-52, 17 FCC Rcd 4798 (2002), at ¶9.
\item \textsuperscript{135} Challenges Must Be Addressed With Effective Leadership and Management, Statement for the Record by David L. McClure Director, Information Technology Management Issues, United States General Accounting Office (GAO) Testimony Before the Committee on Governmental Affairs, U.S. Senate, FED. DOCUMENT CLEARING HOUSE, Congressional Testimony, Jul. 11, 2001.
\end{itemize}
government-to-business (G2B) electronic interaction is well established as government-to-citizen (G2C) and government-to-government (G2G) are on the rise. This trend is likely to accelerate in the next few years. For instance, the current Bush Administration has proposed to remake the federal government into a “click and mortar” enterprise increasingly relying on virtual, on-line interfaces between businesses (G2B), governments and agencies (G2G), and citizens (G2C). This proposal contemplates that the new online interfaces will be made more accessible.

According to another survey conducted in 2000 by the International City/County Management Association and Public Technology, Inc., roughly 83 percent of local governments have Web sites. And, although few local governments provide interactive service delivery on line, many plan to offer such services in the near future. It is therefore not surprising that almost half of all Americans have used a government Web site. Moreover, roughly three-quarters of Americans believe that e-government should be a high priority. The increasing emphasis on e-government will have a profound affect on the roughly 120,000 federal government employees and the fifty-four million American citizens with disabilities.


137. See Statement of Mark Forman Associate Director For Information Technology And E-Government Office of Management And Budget, Before The Subcommittee on Technology And Procurement Policy of The Committee on Government Reform “Turning The Tortoise Into The Hare,” FED. DOCUMENT CLEARING HOUSE , Congressional Testimony, Mar. 21, 2002.

138. See Improving Federal Online Services, Testimony Statement of Sean O'Keefe Deputy Director Office of Management and Budget Before The United States Senate Committee on Governmental Affairs, July 11, 2001, FED. DOCUMENT CLEARING HOUSE, Congressional Testimony, Jul. 11, 2001. See also Challenges Must Be Addressed With Effective Leadership and Management, Statement for the Record by David L. McClure Director, Information Technology Management Issues, United States General Accounting Office (GAO), Testimony Before the Committee on Governmental Affairs, U.S. Senate, Jul. 11, 2001.


140. Id.

141. Id.

142. Id.
Section 508 requires that federal departments or agencies that develop, procure, maintain or use electronic and information technology ensure that the technology allows federal employees with disabilities to have access to and use of information and data that is comparable to the access to and use of information and data by other federal employees. In addition, citizens with disabilities who seek information from a federal department or agency must be afforded “access to and use of information and data that is comparable to that provided to those members of the public who are not individuals with disabilities.” In contrast to § 255 and § 251 of the Communications Act, § 508 applies to the federal government’s use of electronic information technology and data. Because the government purchases roughly ten percent of the information technology sold per year, it is anticipated that the federal government’s procurement policies can affect the private manufacturing and production of equipment and software, and hence the accessibility of said equipment and software.

143. Eva Kaplan-Leiserson, supra note 99, at 28. The U.S. response of instituting accessibility requirements for government procured technology is part of a larger reaction occurring in other western countries as well. According to Nua Internet Surveys, the governments of France, Ireland, Italy, Portugal, the United Kingdom, Canada, and Australia have all issued accessibility guidelines, and most have made accessibility mandatory for federal Websites. Id.


145. It is reported that:

[the nation's biggest technology firms are responding to the federal directive by updating their product lines and rushing to pitch government buyers on their disability-friendly features. For instance, Microsoft Corp. touts software that offers graphics-free screens, which are more easily read by the machines many blind people employ to browse the Web. Hewlett-Packard Co. opened a new office for accessibility issues and has already changed the notices on its printers so that people with visual and other physical problems don't have to make unnecessary trips to the printer when there are glitches with their documents. Government contractors such as Electronic Data Systems Corp. and GTSI Corp. are partnering with small software companies that already offer accessibility products.


Even though Section 508 applies only to federal Web sites (not private sector sites), many experts believe that the law will drive increased AT in the private sector as well. For example, Web sites or portions of Web sites provided under contract to a federal agency must also comply. The stakes are high, as the federal market for technology vendors is $40 billion annually. Currently, there are about 167,000 federal employees with disabilities.

The regulations implementing § 508\textsuperscript{146} which took effect on February 20, 2001, identify the following categories of products and systems to which § 508 is applicable:

- Software applications and operating systems;
- Web-based intranet and Internet information and applications;
- Telecommunications products;
- Video and multimedia products;
- Self-contained, closed products; and
- Desktop and portable computers.\textsuperscript{147}

The provision’s impact has already been manifest in government and industry reactions but it is too soon to declare victory. Some federal agencies have instituted procurement policies consistent with § 508 and the implementing regulations.\textsuperscript{148} However, other government agencies are finding it hard to comply with the deadline.\textsuperscript{149} Moreover, it is not clear that concerns regarding the lack

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\textsuperscript{147} See Ballman, supra note 99.

\textsuperscript{148} Some experts think the new federal rule will eventually trickle down to state and private workplaces as well. See Johnson, supra note 99.

\textsuperscript{149} Dipka Bhambhani, Agency Policies Remain Behind the 508 Curve, GOV’T COMPUTER NEWS, Jun. 24, 2002, at 8.
of speed with which some agencies have implemented compliant policies have been alleviated. For instance, an April 2000 Department of Justice report to the President on § 508 (DOJ Report) reported on the findings of federal agency self-evaluations conducted in 1999. The DOJ Report stressed that even though a number of agencies have embraced accessibility, others needed improvement. The DOJ Report also revealed that (1) agency Internet and Intranet sites contained accessibility barriers, (2) the vast majority of software applications contained some accessibility barriers, despite providing some accessibility to most people with disabilities, (3) telecommunications posed specific accessibility issues for most people with disabilities, and (4) few agencies made full use of available services that improve accessibility.150

Efforts by government employees with disabilities to stimulate more rapid adoption of the accessibility requirements may be undermined by the enforcement mechanism established by § 508. For instance, while the current complaint process may obviate the necessity to use the courts, it may also discourage complainants from using the courts.151 While one of the potential spurs to agency compliance is the threat of a lawsuit, it is reported that there have been "no lawsuits against agencies or their managers for non-compliance. . ."152

While the requirements have only recently been adopted, the pervasive nature of continuing accessibility problems referenced above reasonably could lead to numerous complaints being filed. However, once a complaint is filed, the process for resolution discourages publication and scrutiny of the problem via resort to the courts. Complaints are first handled within the alleged non-complying agency. In the event there is no resolution at the agency level, complainants are then entitled to file suit in federal court provided that they have exhausted all of their administrative remedies. Even if the complainant is successful, their sole remedy is a repair of the inaccessible system. They are not entitled to compensatory or punitive damages.153


152. Id.

153. Id.
In response to the government requirements and anticipated future market demand, some equipment, software and network vendors have begun to adapt their products to the government’s accessibility requirements. It is argued by some experts that these industry adaptations are prudent regardless of whether they are required by law. Features added in response to federal accessibility requirements often assist users who do not possess newer hardware and software thereby expanding the market for such features. However, despite this obvious spur to enlightened self-interest, where some of the larger vendors have begun to create responsive products with greater accessibility, many firms have not.

D. The ADA: Public Accommodation on the Internet

Some legal commentators have suggested that the ADA requires Internet Web pages and other methods of effective communication to be accessible to individuals with disabilities. These arguments are supported by a Department of Justice Opinion Letter interpreting the ADA and some case law.

The ADA was passed to ensure that Americans with disabilities experienced equality of opportunity, full participation, and self-sufficiency such that they could compete for society’s goods and services on an equal footing with all other Americans. The ADA establishes anti-discrimination safeguards for persons with disabilities in private as well as public sectors in the areas of employment (Title I), use of public services (Title III), access to public accommodations (Title III), and telecommunications relay services (Title IV). Title III of the ADA prohibits public and private entities providing public accommodations from discriminating against individuals with disabilities. By prohibiting such discrimination, Title III of the ADA provides a tool for assuring that individuals with disabilities receive equal access to the broad variety of businesses, goods and

155. Cynthia Waddell & Kevin Lee Thompson, Is Your Site ADA-Compliant?, INTERNET LAW., Nov. 1998 (citing an opinion letter of the U.S. Department of Justice dated September 9, 1996 stating that “[c]overed entities under the ADA are required to provide effective communication regardless of whether they generally communicate through print media, audio media or computerized media such as the Internet.”). See also Jeffrey R. Young, For Students with Disabilities, the Web Can Be a Classroom Without a Ramp, CHRON. HIGHER EDUCATION, Mar. 13, 1998, at A31.
157. See Jonathan Bick, supra note 106.
158. Id.
services available to individuals without disabilities.

Central to the effectiveness of Title III is the definition of "public accommodations." Title III identifies twelve categories of entities that are defined as public accommodations provided their operations affect commerce. These entities include:

- places of lodging;
- places serving food or drink;
- places of exhibition or entertainment;
- places of public gathering;
- commercial sales or rental establishments;
- service establishments;
- stations used for specified public transportation;
- places of public display or collection;
- places of recreation;
- places of education;
- social service center establishments; and
- places of exercise or recreation. 159

It is argued that the breadth of Title III extends the ADA's public accommodation requirement to virtually every aspect of the interaction between the American public, business and other entities. 160 And further, that the ADA presents the opportunity to extend accessibility requirements to private virtual and brick and mortar businesses. 161

Indeed, at least one organization has argued that the ADA would find private Web sites as public accommodations that must be accessible to individuals with disabilities. 162 In 1999, the National Federation of the Blind sued America Online (AOL), alleging that AOL's then-current version 5.0 software was inaccessible to as many as nine million visually impaired Americans and therefore was in violation of the ADA. 163 The parties settled without assigning any

159. Id.
160. Id.
161. Id. It is argued that "as e-commerce and the use of the Internet become commonplace, Internet service providers, Internet portals and Internet sites are more likely to be recognized as public accommodations subject to the ADA." Id.
culpability to AOL. However, under the settlement, AOL agreed to post its accessibility policy on its Web site, develop an accessibility checklist for its employees, make its then software version more compatible with electronic text readers, establish an accessibility officer, and continue to work with advocacy groups; AOL also solicits public comment about the accessibility of its Web site and services.\textsuperscript{164}

Because the suit was settled, it has been lamented that the court did not rule on whether commercial Web sites are in fact "public accommodations" as defined by the ADA and what if any accessibility guidelines should apply.\textsuperscript{165} At least one commentator argued that Web sites should be deemed places of public accommodation and cited for support the Justice Department's issuance of an attorney general's letter in 1996 stating that commercial Web sites are covered by the ADA and that complaints under the ADA against Web sites may be pursued.\textsuperscript{166} The Justice Department reaffirmed its interpretation in a subsequent amicus brief filed in \textit{Hooks v. OKBridge}.\textsuperscript{167} In its amicus brief, the Justice Department argued that the definition of public accommodations "should not be limited to companies providing services to customers at a physical location and that in any event, the size of the site's membership (nearly 20,000), the members' national and international distribution, and the site's profit-making intent made the site a place of public accommodation."\textsuperscript{168}

Reliance was also placed on the ruling in \textit{Carparts Distribution Center, Inc., et al., v. Automotive Wholesalers Association of New England, Inc., et al.}, (hereinafter Carparts)\textsuperscript{169} in which the First Circuit held that the reach of Title III of the ADA was not limited solely to interactions in physical structures. In addition, the First Circuit concluded: "It would be irrational to conclude that persons who enter an office to purchase services are protected by the ADA,\textsuperscript{168}.

\begin{itemize}
\item 164. \textit{Id.}
\item 165. \textit{See Ballman, supra note 99 (citing \url{http://www.usdoj.gov/crt/foia/ tal712.txt}).}
\item 166. \textit{See id.}
\item 168. \textit{See \url{http://www.usdoj.gov/crt/ada/aprsep00.htm}.}
\item 169. \textit{Carparts Distribution Center, Inc., v. Automotive Wholesalers Association of New England, Inc., 37 F.3d 12 (1st Cir. 1994). The plain meaning of the terms do not require "public accommodations" to have physical structures for persons to enter. Even if the meaning of "public accommodation" is not plain, it is, at worst, ambiguous. This ambiguity, considered together with agency regulations and public policy concerns, persuades us that the phrase is not limited to actual physical structures. \textit{Id.}}
\end{itemize}
but persons who purchase the same services over the telephone or by mail are not. Congress could not have intended such an absurd result."170 If access to public accommodations was not limited to physical structures and extended to telephone or mail interactions, would it not also extend to Web-based Internet interactions?

A subsequent decision in the Seventh Circuit affirmed in dicta that Title III was not limited to physical structures and interpreted the ADA as applicable to Web sites. In *Doe v. Mutual of Omaha Insurance Company*, (hereinafter *Doe*) the Seventh Circuit stated in dicta:

The core meaning of this provision, plainly enough, is that the owner or operator of a store, hotel, restaurant, dentist’s office, travel agency, theater, Web site, or other facility (whether in physical space or in electronic space...) that is open to the public cannot exclude disabled persons from entering the facility and, once in, from using the facility in the same way that the non-disabled do.171

Further, in *Pallozzi v. Allstate Life Ins. Co.*, the Second Circuit, citing the *Carparts* decision, also read Title III as guaranteeing more than physical access to individuals with disabilities.172 Thus, in the First, Second, and Seventh Circuits, public accommodations under Title III of the ADA may be said to extend to non physical places including virtual/electronic ones as well as places that are physical structures. The holdings in theses cases support the conclusion that the ADA may be extended to private Web sites.

There is, however, ample precedent to the contrary in other circuits. The most recent decision conflicting with those of *Carparts*, *Pallozzi*, and *Doe*, is *Access Now, Inc., v. Southwest Airlines, Co.*

170. *Carparts*, 37 F.3d at 22.

171. *Doe v. Mutual of Omaha Insurance Company*, 179 F.3d 557, 559 (1999), (citing *Carparts Distribution Center, Inc. v. Automotive Wholesaler’s Ass’n of New England, Inc.*, 37 F.3d 12, 19 (1st Cir. 1994)).

172. “Title III’s mandate that the disabled be accorded ‘full and equal enjoyment of the goods, [and] services ... of any place of public accommodation,’ *id.*, suggests to us that the statute was meant to guarantee them more than mere physical access. *Cf. Carparts*, 37 F.3d at 20 (“To ... limit the application of Title III to physical structures ... would severely frustrate Congress’s intent that individuals with disabilities fully enjoy the goods, services, privileges and advantages, available indiscriminately to other members of the general public.”). We believe an entity covered by Title III is not only obligated by the statute to provide disabled persons with physical access, but is also prohibited from refusing to sell them its merchandise by reason of discrimination against their disability.” *Pallozzi v. Allstate Life Ins. Co.*, 198 F.3d 28 (2d Cir. 1999).
In Access Now, the district court ruled that the provision of a long-term disability plan by an employer and administered by an insurance company would not fall within the purview of Title III. In the course of its opinion, it also concluded that the First Circuit in Carparts had "disregarded the statutory canon of construction, noscitur a sociis ... that instructs that a ... term is interpreted within the context of the accompanying words 'to avoid the giving of unintended breadth to the Acts of Congress.'" In Access Now, the district court stated:

The clear connotation of the words in § 12181(7) is that a public accommodation is a physical place. Every term listed in § 12181(7) and subsection (F) is a physical place open to public access. The terms travel service, shoe repair service, office of an accountant or lawyer, insurance office, and professional office of a healthcare provider do not suggest otherwise. Rather than suggesting that Title III includes within its purview entities other than physical places, it is likely that Congress simply had no better term than "service" to describe an office where travel agents provide travel services and a place where shoes are repaired. [The] office of an accountant or lawyer, insurance office, and professional office of a healthcare provider, in the context of the other terms listed, suggest a physical place where services may be obtained and nothing more. To interpret these terms as permitting a place of accommodation to constitute something other than a physical place is to ignore the text of the statute and the principle of noscitur a sociis.

In Parker, v. Metropolitan Life Insurance Company, et al, the Sixth Circuit concluded that "a public accommodation is a physical place." The court cited as prior precedent its ruling Stoutenborough v. National Football League, Inc., in which it held that the television black-out rule prohibiting the telecast of home games in which stadium attendance was deficient did not discriminate against hearing impaired individuals in contravention of the ADA.

175. Parker v. Metropolitan Life Ins. Co., 121 F.3d 1006, 1014 (6th Cir. 1997).
176. Id.
This was so even if the exercise of the black-out rule rendered the hearing impaired individuals unable to access football games when solely provided via radio.\textsuperscript{178} While the stadiums in which the games are held are places of public accommodation, televised broadcasts of the games are not.

Similarly, the Third Circuit has concluded that the “plain meaning of Title III is that a public accommodation is a place.”\textsuperscript{179} The Court reasoned that “[r]estricting “public accommodation” to places is in keeping with jurisprudence concerning Title II of the Civil Rights Act of 1964.\textsuperscript{180} Finally, the Third Circuit also took issue with the First Circuit’s interpretation of Title III of the ADA and its conclusions regarding the meaning of the term “public accommodation.” Aligning itself with the Sixth Circuit, the Third Circuit noted that the First Circuit “failed to read the examples . . . in the context of the other examples of public accommodations.”\textsuperscript{181} The Third Circuit also noted that the doctrine of noscitur a sociis, if followed, would have led to the conclusion that the term “public accommodation” in Title III of the ADA is not ambiguous and refers to places of physical structure rather than to non-physical access.\textsuperscript{182}

\textbf{E. The Assistive Technology Act (ATA) and the New Freedom Initiative (NFI)}

In the Assistive Technology Act of 1998 (ATA),\textsuperscript{183} Congress made a number of critical

\begin{footnotesize}
\begin{enumerate}
\item[178.] \textit{Id.} at 582. The Court rejected plaintiffs’ argument that: “they were denied substantially equal access to live television transmissions of football games which is a service of a public accommodation.” The Court held that the NFL did not fall within any of the twelve categories enumerated under Title III of the ADA. It further held that “the prohibitions of Title III are restricted to ‘places’ of public accommodation . . .” The Court acknowledged that “the football games were played in a place of accommodation and that the television broadcasts were a service provided by the [NFL], . . . the broadcasts “do not involve a ‘place of public accommodation.’” Ultimately, the Court also concluded that “plaintiffs’ argument that the prohibitions of Title III are not solely limited to ‘places’ of public accommodation contravenes the plain language of the statute.”
\item[179.] \textit{Ford v. Schering-Plough Corp.}, 145 F.3d 601, 612 (3d Cir. 1998).
\item[180.] 42 U.S.C. § 2000(a) (1994). The \textit{Ford} court argued that: “Title II proscribes racial and religious discrimination in the goods, services, facilities, privileges, advantages, and accommodations of any place of public accommodation . . . .” 42 U.S.C. § 2000a(a). This proscription has been limited to places rather than including membership in an organization, see Welsh v. Boy Scouts of Am., 993 F.2d 1267, 1269-75 (7th Cir. 1993), and rather than encompassing an organization’s operations unconnected to any physical facility. \textit{Ford}, 145 F.3d at 614. \textit{See also Clegg v. Cult Awareness Network}, 18 F.3d 752, 755–56 (9th Cir. 1994).
\item[181.] \textit{Ford}, 145 F.3d at 614.
\item[182.] \textit{Id.}
\end{enumerate}
\end{footnotesize}
findings, which are of notable interest. First, it found that many individuals with disabilities cannot access existing telecommunications and information technologies and are at risk of not being able to access developing technologies because of the failure of federal and state governments, hardware manufacturers, software designers, information systems managers, and telecommunications service providers to account for the specific needs of individuals with disabilities in the design, manufacture, and procurement of such technologies. This results in the exclusion of individuals with disabilities from the use of telecommunications and information technologies and thus incurs unnecessary costs associated with the retrofitting of devices and product systems.

Second, Congress concluded that there are insufficient incentives for technology manufacturers to apply technology advances to produce assistive technology devices and assistive technology services or to incorporate universal design principles into the design and manufacturing of technology products. Such insufficiency persists despite the value of incorporating universal design principles in reducing the need for many specific kinds of assistive technology devices and assistive technology services. Third, Congress found that part of the reason for the insufficiency of incentives was the perception that individuals with disabilities constitute a limited market. Finally, Congress concluded that federal agencies and research entities did not commit resources on an ongoing basis to technology transfer initiatives that would benefit, and especially increase the independence of, individuals with disabilities.

184. For a brief but detailed overview of the ATA, see http://www.resna.org/taproject/library/laws/ata98sum.html.
186. Id. at § 2(a)(9).
187. Under the Act, universal design is defined as “a concept or philosophy for designing and delivering products and services that are usable by people with the widest possible range of functional capabilities, which include products and services that are directly usable (without requiring assistive technologies) and products and services that are made usable with assistive technologies.” Assistive Technology Act of 1998, P.L. 105-394, at § 3(a)(17).
188. Id. at § 2(a)(10). The incorporation of the principles of universal design at the design stage would avoid the subsequent cost of retrofitting equipment already in the production and marketing phases, increase equipment utility and increase demand. When universal design principles are not incorporated at the design stage, the necessity to retrofit equipment subsequent to its production increases costs. Costs can arise from retrofitting all equipment to meet new standards or from developing new features in a subset of the larger product pool resulting in two lines of products with overlapping but differing features rather than one product line incorporating all features. Id.
189. Id. The initial incorporation of universal design principles would address this perceived limitation.
190. Id. at § 2(a)(12). Part of the reason for this result is said to be that the technology developed by the federal government may be difficult to exploit given the limited scale and
Among the activities Congress sought to facilitate in response to the acknowledged needs would include: federal financial support for the discretionary state funding of private-public partnerships and/or cooperatives to develop assistive technology products and services,\footnote{191} technology transfers which facilitate the development of assistive technology and products incorporating the principles of universal design,\footnote{192} and funds to support the research and development by commercial or other enterprises and institutions of higher education of universal design concepts for information technology.\footnote{193}

The Bush administration’s New Freedom Initiative (NFI) policy initiative addresses some of Congress’s original concerns regarding access to assistive technology.\footnote{194} However, a substantial portion of the federal effort contemplated and supported under the ATA appears not to have been carried forward into the NFI and hence is not likely to survive past the year 2005, absent action by Congress. For

\begin{footnotes}
\footnote{191} Assistive Technology Act of 1998, Title I, Sec. 101(b) (3) (F). The State may support partnerships and cooperative initiatives between the public sector and the private sector to promote greater participation by business and industry in (i) the development, demonstration, and dissemination of assistive technology devices.

\footnote{192} Id. at § 212. Technology Transfer and Universal Design, (a) In General.—The Director of the National Institute on Disability and Rehabilitation Research may collaborate with the Federal Laboratory Consortium for Technology Transfer established under section 11(e) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710(e)), to promote technology transfer that will further development of assistive technology and products that incorporate the principles of universal design; . . . (4) to develop strategies for applying developments in assistive technology and universal design to mainstream technology, to improve economies of scale and commercial incentives for assistive technology; and (5) to cultivate developments in assistive technology and universal design through demonstration projects and evaluations, conducted with assistive technology professionals and potential users of assistive technology devices.

\footnote{193} Id. \footnote{194} For a full explanation of the NFI proposal, see http://www.whitehouse.gov/news/freedominitiative/freedominitiative.html.
\end{footnotes}
instance, under the ATA, the federal government made monies available to the states to "undertake activities that assist each State in maintaining and strengthening a permanent comprehensive statewide program of technology-related assistance, for individuals with disabilities of all ages. . . "195

The NFI includes major commitments to assistive technology research conducted by the National Institute on Disability and Rehabilitation Research (NIDRR), expansion of funds for ATA loans to individuals with disabilities under the Alternative Financing Program (AFP) of Title III of the Assistive Technology Act, and commitments to innovative programs, such as the use of technology to develop home-based entrepreneurship and employment opportunities. 196 However, the NFI has been criticized inter alia, for failing to continue funding for assistive technology demonstration centers. 197

There are several problems with the ATA that have not been

195. Among the activities are: the funding for, access to, and provision of, assistive technology (AT) devices and services. In addition, individuals with disabilities as well as family members and others were to be involved in decisions regarding the maintenance, improvement, and evaluation of state programs and experience greater involvement in decisions related to the provision of AT devices & services. The states were to engage in increased outreach to underrepresented and rural populations. The ATA sought greater coordination among and between state and local agencies and private entities involved in carrying out activities under the Act. In addition, the ATA sought to foster an increased awareness and understanding of as well as changes in the laws, regulations and policies that facilitate the availability or provision of AT devices as well as services. The act sought to ensure that individuals with disabilities transitioning off of welfare or between home and work, would, when appropriate, be able to secure and maintain possession of assistive technology devices. Finally, the Act sought to increase the knowledge of technology providers about the needs of those with disabilities and the knowledge of individuals with disabilities about available technology while increasing the capacity of public agencies and private entities to provide for and pay for assistive technology devices and services. See ATA Section (2)(b) et seq. By comparison, the NFI provides access to low interest loans for the purchase of AT, finances AT focused research by Rehabilitative Engineering Research Centers, provides financing for small businesses seeking to develop, manufacture, and sell AT, and facilitates interagency coordination and oversight. See http://www.whitehouse.gov/news/freedominitiative/freedominitiative.html.


197. AT Messenger, available at http://www.asel.udel.edu/dati/ATmessenger/summer2001/sunset.html. Other concerns about the limited reach of the NFI were raised by the NCD. While the NCD applauded the NFI, it also recommended other efforts the administration should undertake to ensure fulfillment, of the NFI goals including: (a) coordination of efforts among agencies with overlapping jurisdiction; (b) ongoing provision of technical assistance to states and other partners; (c) temporary elimination of the state matching requirements for the AFP until states are on better fiscal footing; (d) clarification of applicable income tax rules and Social Security income and resources limitations to avoid possible disincentives to work; (e) NIDRR research that includes a focus on universal design; and, (f) a comprehensive study of the role the health care system should play in the provision, funding and development of AT. National Council on Disability Feature: People with Disabilities Need Assistive Technology U.S. NEWswire, Aug. 13, 2002.
addressed by the NFI. First, the ATA has limited enforcement tools. Where a state fails to comply, it is subject to the loss of part or all of its funding, redesignation of the overseeing state agency, or exclusion from the following year’s grant cycle. Loss of funding and/or exclusion from a grant cycle is most likely to penalize a state’s citizens with disabilities, who must forgo the incentives such funding may have provided. The NFI appears to do nothing to address this issue. Indeed, noticeably absent from the Executive order is any reference to enforcement of requirements for state activity or state accountability for failure to aggressively pursue NFI goals.198 Also absent is any reference to government facilitation, requirement or enforcement efforts under section 508 of the WIA, §§ 255 and 251(a)(2) of the Communications Act, or Title III of the ADA.199

Second, even before the NFI, the ATA’s sunset provision created funding problems for the states.200 It is argued that without continued federal funding, states will not underwrite the funding of the capacity building necessary to support dissemination of information about the availability of assistive technologies and participation in technology evaluation and design.

Third, it is feared that the ATA federal funds are diminishing just as the number of persons without sufficient funds to purchase such equipment may be increasing. For instance, it is suggested that the impact of welfare reform legislation will decrease the number of persons eligible for public program supports. Among such persons are many individuals with disabilities who will not be able to afford

198. Nothing in this order shall affect any otherwise available judicial review of agency action. This order is intended only to improve the internal management of the Federal Government and does not create any right or benefit, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.

Executive Order 13217, Community-Based Alternatives for Individuals with Disabilities, Jun. 18, 2001.

199. Pursuant to Executive Order 13217, the departments of Justice, Health and Human Services, Education, Labor and Housing and Urban Development, and the Social Security Administration were required to “evaluate the policies, programs, statutes and regulations of their respective agencies to determine whether any should be revised or modified to improve the availability of community-based services for qualified individuals with disabilities” and to report back to the President with their findings. The departments of Transportation and Veterans Affairs, the Small Business Administration, and the Office of Personnel Management, are also involved in the implementation effort, but are not specifically named in the Executive Order. These agencies have formed the Interagency Council on Community Living. See http://www.whitehouse.gov/news/freedominitiative/freedominitiative.html.

accessible technology. It is not clear how the NFI would address this issue, if at all.

Fourth, with the passage of Public Law 107-116, on January 10, 2002, the funding under the ATA is officially terminated by the end of 2005. It appears that the federal government has both recognized the importance of assistive, accessible technology and the critical role of UD in achieving the creation and provision of communications technology possessing prevalent utility. However, such recognition may not translate into a policy possessing sufficient positive or negative incentives to assure the continued, timely incorporation of UD and HCI goals into the creation and improvement of telecommunications and computer equipment and services. For instance, state supported funding initiatives to stimulate products and services of universal design are discretionary and of secondary priority to the main purposes of the ATA. A significant concern raised by the impending loss of federal funding is that states will not opt to support ATA adoption efforts in the absence of federal funding.

VI. CONCLUSION

The societal designation of computer literacy as a pivotal factor of social competence will have a profound adverse impact on those unable to access and/or manipulate computer augmented network technology. Too often, this inability to access or manipulate the technology is not a matter of choice on the part of those excluded, but a failure to understand and account for their needs by those who create and design the technology. Such unintended discrimination

202. At present, there are some fifty-six state assistive technology programs being funded by the National Institute on Disability and Rehabilitation Research (NIDRR) under the Assistive Technology Act of 1998 (P.L. 105-394). There is one project located in each of the 50 states, the District of Columbia, American Samoa, Guam, the Commonwealth of the Northern Marianas, Puerto Rico, and the U.S. Virgin Islands. For more information about each of the programs, see State Assistive Technology Programs: Directory, EXCEPTIONAL PARENT, Jan. 1, 2001, at 79. Federal funding for these programs is slated to end shortly. Under the ATA, federal funding to the programs is to be discontinued after 10 years as encouragement for the states to fully fund and operate their programs. Prior to a one-year extension granted in 2002, twenty-three states would have been eliminated from federal funding in the fiscal year 2003. Liza Porteous, E-Government: Panelists Push For Continued State Funding To Aid Disabled, NATIONAL JOURNAL'S TECHNOLOGY DAILY, Mar. 21, 2002. On January 10, 2002, HR 3061 became Public Law 107-116, making appropriations for the Departments of Labor, Health and Human Services and Education for FY 2002. The law provided funding for one-year extensions to existing programs under the ATA. Federal contributions are then phased out over a three-year period. Laura Noble, Federal Assistive Technology Legislation 1988-Present; Legislative Update, 32 EXCEPTIONAL PARENT, Jun. 1, 2002, at 50.
may be avoided if equipment manufacturers and service providers adopt a design orientation that moves away from a system or designer centered approach to a diverse user-centered approach consistent with the goals of universal design and ergonomics. However, to be effective, the adoption and incorporation of UD principles as well as HCI and ergonomic goals into the design and development of telecommunications equipment and services must include an active, ongoing assessment of impact.

To date, federal government efforts to facilitate the development of assistive technologies in communications and to encourage the adoption of UD principles has centered on assuring access to effective communication and information technology for Americans possessing disabilities as identified in § 255 of the Telecommunications Act of 1996, § 508 of the Workforce Investment Act of 1998, the Americans with Disabilities Act (ADA), and the Assistive Technology Act of 1998 (ATA). Through these legislative efforts, the federal government has sought to assure non-discriminatory access to: public telecommunications networks (§ 255 of the Comm. Act), government networks and information services (§ 508 of the WIA), and private Web sites and information services made available to the public (Title III of the ADA).

The federal government has sought to facilitate the development of accessible and assistive information technologies by mandating their use in the public telecommunications networks it regulates and in its own networks. It has also sought to increase public demand for assistive information technologies and the private production of such technologies via the ATA. Ideally in combination, the statutes stimulate and in many cases mandate the availability of accessible or assistive technology necessary to attach to information networks, require that the networks themselves be accessible, and that certain destinations on the networks (Web sites) be accessible as well.

However, the reach of the statutes is not comprehensive, nor is the implementation of the statutes necessarily effective. The telecommunications network is evolving into multi-functional broadband networks that the current FCC would forbear from regulating. The preferred tool of forbearance is to define broadband networks as something other than telecommunications. Should this policy prevail, meaningful non-discriminatory access to the networks over which information will increasingly travel would be seriously undermined. A decision that broadband networks and services provided over telephone networks are not telecommunications, effectively removes telephone based broadband networks and services
from the requirements of § 255. A decision that broadband networks and services provided over cable, satellite or terrestrial wireless systems are not telecommunications effectively avoids applying § 255 to cable, satellite, or terrestrial wireless broadband networks and services. For this reason among others, the FCC forbearance policy unless modified, should be opposed.

Efforts to assure non-discriminatory access will suffer greatly if Title III of the ADA is ultimately deemed inapplicable to private Web sites open to the public. Given the growing migration of business, education, government, and political transactions to the Web, the failure to make such sites open to the vast majority of Americans assures that many will have diminished capacity to conduct their business and financial affairs, enhance their education and exercise their citizenship. Aside from being excluded from virtual sites to which other members of the public have access, Americans with disabilities will have less incentive to acquire assistive computer and information technologies. This in turn could reduce market demand and discourage the market supply of assistive technologies. It would also be likely to assure that when efforts are undertaken to render such Web sites and information technologies accessible, the retrofit and/or specialization efforts would come with significant additional costs. This in turn establishes a perverse dynamic in which costs precipitated by an initial failure to require accessibility become the basis for denying or delaying the later implementation of accessible upgrades because the cost is now too great. As a result, a two-pronged strategy should be pursued regarding the ADA. Certainly, efforts to resolve statutory ambiguity regarding the ADA’s reach should be pursued in court. However, legislative efforts should also be undertaken to confirm the ADA’s applicability to private Web sites made available to the public.

The implementation of § 508 of the WIA is still in its early stages. Nevertheless, early assessments are somewhat troubling. Agencies have been slow to comply. Agency and industry confusion concerning certification of § 508 product accessibility as well as what constitutes undue burden or commercial unavailability are said to be the likely reasons. This in turn has frustrated agency procurement officers and has some officials concerned that the confusion and lack of guidance may cause some contracting officers to ignore the

Finally, the complaint process is not likely to serve as a spur to accelerate compliance. The process for complaint resolution discourages publication and scrutiny of the problem via resort to the courts. Complaints are first addressed within the non-complying agency. Only after there is no internal resolution of the complaint and all administrative remedies have been exhausted, is a complainant entitled to file suit in federal court. Even if the complainant is successful, their sole remedy is a repair of the inaccessible system. They are not entitled to compensatory or punitive damages.

Resolution of the certification problems under the federal acquisition regulations implementing § 508 are a necessary prerequisite to increased agency and industry compliance. It may also serve to speed resolution of non-compliance complaints. In addition, if non-compliance becomes a substantial concern over time, a time limit should be placed upon the efforts to resolve complaints within agencies. Tolling of the time after good faith efforts to resolve the complaint should provide a presumption that the complaint is ripe for federal court.

Finally, the ATA’s continued viability is key to generating consumer demand for assistive information technology. Its impending demise creates a number of problems, which the NFI does not address. The ATA has limited enforcement tools, yet the NFI does not address the issue. There does not appear to be any reference to any enforcement of a requirement for state activity or state accountability for failure to aggressively pursue NFI goals. The sunset of the ATA will create funding problems for the states unable to foot the bill themselves. But perhaps of most immediate import, the ATA federal funds are diminishing just as the number of persons without sufficient funds to purchase such equipment may be increasing. This is due to the impact of welfare reform legislation that will decrease the number of persons eligible for public program supports. Among such persons are many individuals with disabilities who will not be able to afford accessible technology after the loss of their benefits and the loss of the availability of low cost loans.

The federal government’s policies to stimulate and/or mandate greater access to information technology, while potentially comprehensive and far reaching, suffer from significant applicability, implementation, and funding problems. Failure to address them now, assures that the design, creation, and deployment of accessible

204. Id.
technology and public access thereto will be delayed. And those technologically incompetent innocents will continue to be denied access in a country and an economy that requires technological proficiency. Such a result is inherently unfair and should be ultimately avoided.