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eQuality: The Right to the Web

Peter Blanck Ph.D., J.D.[1]

Introduction

This chapter and the book it is based upon, *eQuality: The Struggle for Web Accessibility by Persons with Cognitive Disabilities* (2014, Cambridge University Press), was spurred several years ago by Dr. David Braddock, Executive Director of the Coleman Institute for Cognitive Disabilities. Dr. Braddock asked me to examine the right under the Americans with Disabilities Act (ADA) to web access for people with cognitive and other disabilities.

Given the ubiquity of online activity in the United States and most of the world, as well as the shifting of nearly all daily interactions and activities to the Internet, the right under the ADA and other laws to web equality may seem obvious. However, establishing the rights of individuals with disabilities, and in particular of individuals with cognitive disabilities—intellectual and developmental disabilities, autism, traumatic brain injury, and other conditions—has seldom come without legal and political struggle, which also is necessary to achieve a broader shift in attitudes and practice.[2]

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[1] University Professor & Chairman, Burton Blatt Institute, Syracuse University, 900 South Crouse Avenue, Suite 300, Syracuse, New York 13244, U.S.A. This updated chapter is drawn from Peter Blanck, *eQuality*: *The Struggle for Web Accessibility by Persons with Cognitive Disabilities* (2014). Correspondence to: Peter Blanck, Burton Blatt Institute, Syracuse University, 900 South Crouse Avenue, Suite 300, Syracuse, New York 13244, U.S.A. E-mail: pblanck@syr.edu. This line of study was supported in part by grants from the Administration on Community Living (ACL) and the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR), in the U.S. Department of Health & Human Services, and the Office for Disability and Employment Policy (ODEP), in the U.S. Department of Labor. For additional information on this project and funding, *see* http://bbi.syr.edu.

[2] *See, e.g.*, Peter Blanck & Mollie W. Marti, Attitudes, Behavior, and the Employment Provisions of the Americans with Disabilities Act, *Villanova L. Rev.*, 42(2), 345-408 (1997).

This chapter continues a line of study examining the full and equal enjoyment (accessibility and usability) of web content with particular reference to people with cognitive disabilities. It explores how web content equality grounded in law and policy is necessary for people with cognitive and other disabilities, such as adults aging with the onset of cognitive and physical disabilities, to fully partake and flourish in the information age.[3] To that end, this chapter overviews the struggle for web equality for people with cognitive disabilities. It presents definitions, legal challenges and rights that are developed more fully in *eQuality*, and it reflects on new developments associated with the Semantic Web and the "Internet of Things," and in disability law and policy in the U.S. (e.g., Section 508 refresh and web equality case law) and globally (e.g., developments in CRPD Articles 9 and 12, and European standardization efforts) since *eQuality* was published.

Defining Web eQuality

Full and equal access to the Internet's World Wide Web (web) is an enabler of other basic human and civil rights.[4] The web supports the freedoms of speech, association, and civic engagement.[5] Yet, while it is fundamental to exercising one's rights of citizenship,[6] access to the technology tools of the Internet alone is not sufficient to guarantee web equality. Overly complex interfaces, lack of information alternatives (e.g., symbols along with text, captions instead of

[3] *See, e.g.*, Peter Blanck & Jonathan J. Martinis, "The Right to Make Choices": National Resource Center for Supported Decision-Making, *Inclusion*, 3(1), 24-33 (2015); Michelle, Putnam, Bridging network divides: Building capacity to support aging with disability populations through research, *Disability and Health Journal*, 7(1), S51-S59 (2014).

[4] Stephen B. Wicker & Stephanie M. Santoso, Access to the Internet Is a Human Right, *Communications of the ACM*, 56(6), 45-46 (June 2013).

[5] *See also* Ivan Illich, *Tools for Conviviality; available at:* http://www.preservenet.com/theory/Illich/IllichTools.html (last visited Jan. 13, 2015).

[6] *See* G. Anthony Giannoumis & Jennifer Kline, Active citizenship through the use of new technologies–the experiences of three generations of persons with disabilities, DISCIT, 7.2 (2015); Delia Ferri, Analytical Framework for a Comparative Analysis of Accessible Technology Law and Policy, DISCIT, 7.1 (2014); Rune Halvorsen & Bjorn Hvinden, Active Citizenship for persons with disabilities-Current knowledge and analytical framework, DISCIT, 2.1 (2013).

audio), and the inability to transform content presentation all prevent effective use of the tool that is the Internet's web. *Access alone is not web content equality*.

I have described web *eQuality* as the opportunity for *full and equal enjoyment* of web content across all its technologies and interfaces:

> Full and equal enjoyment of the web is to have the meaningful and reasonably comparable opportunity to enjoy–access and use–web content, and to not be excluded from that prospect on the basis of cognitive and other disabilities, either by individuals, organizations, or through the design of web technology.[7]

This proposition, including the opportunity for active citizenship, is "the right to share in the full social heritage," as embodied in civic, educational, economic, and social information available to autonomous citizens.[8] The elements of citizenship include the opportunity to participate in the democratic endeavor and to be meaningfully heard as a part of that community. In this sense, web content equality is a fundamental right and an enabler of other human and economic liberties. It is a means for fulfillment through human cognition. Web technology has the unique potential to reduce the attitudinal, behavioral, and structural barriers encountered by individuals with a range of cognitive, physical, and sensory capabilities.

I take a civil and human rights approach to disability and frame web equality within the norms and legal obligations of the ADA and the U.N. Convention of the Rights of Persons with Disabilities (CRPD).[9] These and other legal instruments, and their associated regulations and commentaries, articulate this right as the opportunity for comparable use of web content by

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[7] Peter Blanck, *eQuality: The Struggle for Web Accessibility by Persons with Cognitive Disabilities*, at 245, Cambridge University Press (2014) [hereinafter "*eQuality*").

[8] T.H. Marshall, *Citizenship and social class: And other essays*, at 150, 154, Cambridge [Eng.]: University Press (1950).

[9] The Committee on the Rights of Persons with Disabilities, Eleventh session, 31 March–11 April 2014, in its General comment No. 2 (May 22, 2014) on Article 9: Accessibility writes: "Accessibility is a precondition for persons with disabilities to live independently and participate fully and equally in society. Without access to … information and communications technologies and systems, … persons with disabilities would not have equal opportunities for participation in their respective societies. It is no coincidence that accessibility is one of the principles on which the Convention on the Rights of Persons with Disabilities is based."

persons with disabilities in ways reasonable under the circumstances. They direct that freedom from discrimination in the digital online experience is achieved when persons with disabilities have the meaningful opportunity, with or without accommodation, to equivalent web usage as those without disabilities, and not only by access to separate or alternative knowledge and services. The power of the web is in its potential to mitigate barriers to knowledge that drive and inform human cognition, speech and ideas. The web increases the opportunity for individuals and collectives to share knowledge, although structural barriers such as poverty and a lack of access to technology continue to stand in the way of full access to the information society.

Presently, to approach web equality, people with a range of disabilities require modifications and accommodations in service design when reasonable and feasible to do so. These accommodations alone do not, and cannot, guarantee that in all circumstances people with disabilities will have the same outcomes from their activities on the web. In this sense, *web equality does not necessarily equate with content impartiality*, because there may be judgment at some point prior to the end user to determine what information will be offered and how. While it is expected that content transformations and substitution of equivalent information would be directed by the end user, there is still a filtering process that may raise concerns about how web content is selected. Would certain alternate content be favored over another and, if so, why?

With such caveats, I use the term *eQuality* to emphasize two ideals: the first is the conception of equality and justice under law. Thus, in the ADA there may be found a justiciable right to web equality for persons with cognitive and other disabilities. The second is the conception of "*e*lectronic *quality*," which is to signify that the meaningful and objective opportunity for the comparable use of web content by persons across the spectrum of disability is possible, with particular reference to individuals with cognitive disabilities. The right to enjoy

digital knowledge and social interaction is encompassed by the freedom from discrimination solely as a consequence of disability, and is established by the ADA and recognized in the CRPD.

Rights of Persons with Cognitive Disabilities

Although in the U.S. the ADA has been in effect for twenty-five years and there has been a concordant growth in the strength of the disability rights movement worldwide,[10] web equality for people with cognitive disabilities has received limited attention, and when examined has faced resistance and pushback.[11] Under the ADA, the right to web equality, as for other rights assuring nondiscriminatory access to society, is considered on an individualized basis in circumstances involving the human and computer interaction. Those individuals with cognitive and other disabilities who choose to engage with the web must have the prospect for reasonably equivalent and comparable use of its electronic content, as do others without disabilities in the same situation.

Nondiscrimination in the full and equal enjoyment of web content offered by commercial entities is addressed by the ADA's third chapter (title III), which covers services offered by "public accommodations," including those of online service providers. Freedom from discrimination because of disability in the use of the online activities of public accommodations (and of state and local governments under ADA title II), and the corresponding obligation to make modifications within reason to ensure that services offered are equally enjoyable, are

[10] *See* Peter Blanck, ADA at 25 and Persons with Cognitive Disabilities: From Voice to Action, *Inclusion*, 3(2), 46-54 (2015); Peter Blanck, ADA at 25 and Persons with Cognitive Disabilities: From Action to Inclusion, *Inclusion*, __, __ (in press, 2015).

[11] *See infra* (U.S. Access Board Section 508 "refresh" excludes functional criteria for individuals with cognitive disabilities). *See also* Eli Pariser, *The Filter Bubble: What the Internet is Hiding from You*, at 5 (2011).

among the means by which people with disabilities meaningfully participate in the digital information society.

The ADA's preamble establishes its mandate as to ensure equal opportunity, inclusion, independent living, and opportunity for economic self-sufficiency.[12] The web is a major driver of these principles.[13] For this reason, the lack of equal opportunity to participate on the web, whereby separate access to web content becomes the default means for interaction, is *inherently not equal* for people with cognitive and other disabilities who aim to enjoy such services.[14] The full and equal enjoyment of web content requires at least the fair opportunity for substantive equality in online participation.

The World Wide Web Consortium (W3C) defines equivalent web content as that which is an "acceptable substitute," adaptation, and alternative that "fulfills essentially the same function or purpose as the original content upon presentation."[15] Alternative content removes reliance upon any one mode and cognitive mechanisms for comprehension: text can be heard instead of seen, audio can be read instead of heard, images are described instead of seen, symbols replace words, and so on. This seemingly complex suspension of modal reliance is actually and often achieved simply in web content as well as in other digital content. An illustration of a common adaptation is transformations in presentation, such as text enlargements

[12] *See, e.g.*, Fatima A. Boujarwah, Hwajung Hong, Gregory D. Abowd, & Rosa I. Arriaga, Towards a framework to situate assistive technology design in the context of culture, In *ACM*, Proceedings of the 13th international ACM SIGACCESS Conference on Computers and Accessibility, 19-26 (2011).

[13] *See* Rob Imrie, Universalism, universal design and equitable access to the built environment, *Disability & Rehabilitation*, 34(10): 873–882 at 880 (2012). For empirical analyses of access issues facing persons with cognitive and other disabilities, *see* Lisa Schur, Douglas Kruse, D., & Peter Blanck, *People with Disabilities: Sidelined or Mainstreamed?* (Cambridge University Press, 2013) (people with cognitive disabilities are among the most stigmatized and underemployed in society).

[14] G. Anthony Giannoumis, Regulating Web Content: The nexus of legislation and performance standards in the United Kingdom and Norway, *Behav. Sci. & Law*, 32(1), 52-75 (2014).

[15] *See* W3C, [DRAFT] Basic Glossary for WAI Documents (Aug. 9, 2005); *available at*: http://www.w3.org/WAI/lexicon/#equiv (last visited Jan. 13, 2015).

and higher contrasts. Provision of equivalent content, or the capacity for web content to be transformed, is a central element of web equality.

Practically speaking, the enjoyment of web content must be considered in context. This is why laws like the ADA approach such fact-based determinations on a case-by-case basis, and not in terms of prescriptive compliance with web content technical standards and functional performance criteria. This also is the reason that American courts tend to view web equality in accord with notions of the fair and equivalent *opportunity* to participate regardless of disability.[16] The concept of web equality then embodies the comparable choice to participate online, with or without appropriate supports, and without discrimination on the basis of disability.

Given historical and present attitudinal discrimination, web equality is a means to ensure that disability is respected as an element of human diversity, when individuals and communities otherwise would directly or indirectly exclude disabled individuals. The ADA accords people with disabilities individual and collective rights to web equality, regardless of obvious or hidden characteristics that may subject them to artifactual, invidious, and paternalistic forms of prejudice and discrimination. The CRPD's Article 9, for instance, conceives of web accessibility as the opportunity to have equivalent access to and use of web content, and for individuals not to be excluded unreasonably from that prospect because of disability.[17]

Global Context

The human rights of disabled people set out in the CRPD are recognized by more than one hundred and fifty nations that have ratified the treaty.[18] The CRPD reflects a commitment by

[16] *See, e.g.*, K.M. v. Tustin Unified School District, and K.H. v. Poway Unified School District, 725 F.3d 1088, 1096-97, 1101 (9th Cir. 2013). *Compare* T.H. Marshall, *Citizenship and Social Class*, 148-54, at 148 (1950), in *Inequality and Society* (eds. Jeff Manza & Michael Sauder, 2009).

[17] *See* Committee on the Rights of Persons with Disabilities, Eleventh session, *supra*.

[18] Convention on the Rights of Persons with Disabilities, GA Res 61/106, UN Doc. A/RES/61/106 (Dec. 13, 2006) (hereinafter, CRPD); *available at*: http://www2.ohchr.org/english/law/disabilities-convention.htm (last

member states to value participation and citizenship by persons with disabilities in the global community. Article 1 of the CRPD states as its purpose "to promote, protect and ensure the *full and equal enjoyment* of all human rights and fundamental freedoms by all persons with disabilities, and to promote respect for their inherent dignity."[19] Persons with disabilities are those with long-term physical, sensory, mental, and cognitive impairments who face societal barriers that "hinder their *full and effective participation in society* on an equal basis with others" without such conditions.[20]

The CRPD's human rights lens is similar to, but different than, that of the ADA's civil rights approach. Its enumerated fundamental liberties are expressed as universal and interrelated conditions arising from the human experience. These liberties are not granted by governments or laws. Rather, they are fundamental to personal dignity and fulfillment, autonomy and capacity, regardless of disability.

Among its protections, the CRPD (Article 9, Accessibility) establishes obligations for States Parties to ensure comparable access to communications technology.[21] Johan Borg and colleagues argue that the CRPD declares for people with disabilities the right to technology equality "to ensure their *full and equal enjoyment* of all human rights and fundamental freedoms."[22] Although as of yet the U.S. Senate has declined to ratify the CRPD, the ADA

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visited Jan. 13, 2015). *See also* David Sloan & Sarah Horton, Global considerations in creating an organizational web accessibility policy, In Proceedings of the 11th Web for All Conference, p. 16. *ACM* (2014).

[19] CRPD, *supra* (emphasis added). *See also* Jerome E. Bickenbach, Disability, Culture and the U.N. Convention, *Disability and Rehabilitation*, 31:1111–1124 (2009; Court of Justice of the European Union, Press Release No. 82/13, Luxembourg (July 4, 2013); re: Judgment in Case C-312/11: Commission v. Italy; *available at*: http://curia.europa.eu/juris/documents.jsf?num=C-312/11 (last visited Jan. 13, 2015).

[20] CRPD, *supra* (Article 1) (emphasis added).

[21] CRPD, *supra*.

[22] Johan, Borg, Stig Larsson, & Per-Olof Östergren, The right to assistive technology: For whom, for what, and by whom?, *Disability & Society*, 26(2), 151-167, at 165 (2011) (emphasis added). *See also* Johan Borg, Ann Lantz, & Jan Gulliksen, Accessibility to electronic communication for people with cognitive disabilities: A systematic search and review of empirical evidence, *Universal Access in the Information Society*, 1-16 (2014); Gerard Goggin, Communication rights and disability online: Policy and technology after the World Summit on the

directs that in a free society, people with disabilities have the equal right to use online materials to learn, work, play, communicate, shop, and participate fully in their communities.

Web Ubiquity

Almost one half (42%) of the world's seven billion individuals use the web.[23] During the prior fifteen years, web usage has increased globally at a tremendous rate. Web usage is expected to further accelerate for those who previously have faced barriers to it, including those with cognitive disabilities and those who are aging (or who acquire cognitive disabilities with age), those living in poverty, and others who face economic and political restrictions to web access. More people use mobile and tablet devices to access the web than desktop personal computers.[24] In 2014, there were more than one billion smartphones and tablets bought worldwide, and this number is set to double by the end of 2015.[25] In the past three years, there have been billions of mobile subscriptions accessed across the globe and tens of billion mobile applications ("apps") downloaded.[26]

How many of these apps are accessible to and usable by persons with cognitive disabilities? At astounding rates, people are accessing web content on multiple devices, and often

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Information Society, *Information, Communication & Society*, 1-15 (2014) (disability, Internet, and citizenship policy discussions at the World Summit on the Information Society (WSIS) in 2014 and 2015).

[23] *See* Internet World Stats, http://www.internetworldstats.com/stats.htm (last visited Jan. 13, 2015) (based on web usage and world population statistics as of June 30, 2014). *See also* Wolfgang F.E. Preiser & Korydon H. Smith, Introduction, *Universal Design Handbook*, at xxvii-iii at xxviii (2nd ed. 2011) (Hereinafter "*UD Handbook*").

[24] *See generally* Henry Blodget, *The Future of Digital*, *Business Insider* (2014) (smart phones and tablets out sell PCs); *available at*: http://www.businessinsider.com/the-future-of-digital-2014-slide-deck-2014-12#-70 (last visited Jan. 13, 2015).

[25] *See, e.g.*, Natasha Lomas, Gartner: 1.2 Billion Smartphones, Tablets To Be Bought Worldwide in 2013; 821 Million This Year: 70% Of Total Device Sales, AOL Tech (Nov. 6, 2012); *available at*: http://techcrunch.com/2012/11/06/gartner-1-2-billion-smartphones-tablets-to-be-bought-worldwide-in-2013-821-million-this-year-70-of-total-device-sales/ (last visited Jan. 13, 2015); Jun Yang, Smartphones in Use Surpass 1 Billion, Will Double by 2015, Bloomberg (Oct 17, 2012); *available at*: http://www.bloomberg.com/news/2012-10-17/smartphones-in-use-surpass-1-billion-will-double-by-2015.html (last visited Jan. 13, 2015); Mobiforge, 36 must-know mobile market statistics for 2014 (Jan. 6, 2015); *available at*: http://mobithinking.com/mobile-marketing-tools/latest-mobile-stats & http://mobiforge.com/research-analysis/36-must-know-mobile-market-statistics-2014 (last visited Jan 13, 2015) (number of smartphones worldwide expected to hit over 1.3 billion during 2014).

[26] *See, e.g.*, Mobiforge, *supra*.

simultaneously, expecting real-time responsiveness and ubiquitous usage across contexts and environments. Do persons with cognitive disabilities have such equivalent opportunities?

Web Content

Computer engineers and scientists, policymakers, and disability advocacy groups consider web content to be online digital information derived from human and machine operations and transferred to users by various means. Nonetheless, the definition of web content is far from clear for purposes of legal analysis.[27]

Social networking websites often distinguish among web content, online data, and metadata ("data that explains or describes other data").[28] However, each are forms of knowledge-based digital information that allow for online participation and the sharing of electronic text, images, and other modes of communication, and expressed in computer code, data, and semantic information in machine readable formats.[29] The W3C's Web Content Accessibility Guidelines (WGAG, presently in version 2.0) conceives of web content as the "information and sensory experience to be communicated to the user by means of a user agent (e.g., a browser), including code or markup that defines the content's structure, presentation, and interactions."[30]

User-based Content

[27] *See, e.g.*, European Commission, Proposal for a Directive of the European Parliament and of the Council on the accessibility of public sector bodies' websites, at 14 (Dec. 3, 2012) (web "content" is information communicated to user by user agent, including code or mark-up that defines content structure, presentation, and interactions); *available at*: http://ec.europa.eu/digital-agenda/en/news/proposal-directive-european-parliament-and-council-accessibility-public-sector-bodies-websites (last visited Jan. 15, 2015).

[28] *See, e.g.*, Facebook, Statement of Rights and Responsibilities (Date of Last Revision: Nov. 15, 2013); *available at*: http://www.facebook.com/legal/terms (last visited Jan. 15, 2015). *See also* W3C, Web Services Glossary (Feb. 11, 2004); *available at*: http://www.w3.org/TR/ws-gloss/ (last visited Jan. 15, 2015).

[29] Facebook, Data Use Policy: Information We Receive About You; *available at*: http://www.facebook.com/about/privacy/your-info (last visited Jan. 15, 2015).

[30] *See* W3C, Definition of a Web Content; *available at*: http://www.w3.org/TR/WCAG20/ (last visited Jan. 15, 2015).

The web's architecture enables online service providers, such as social media services, to organize and maintain digital information about users in computer code. One common form of such metadata collection is "cookies," which are tracking devices that create summaries of user data.[31] Other metadata content derive from the use of the web and its applications, such as information about electronic book (eBook) usage and purchases made using a browser service.[32]

Location-based web content and services may be offered using meta-data, such as information retrieved from a device's global positioning system (GPS) and Internet Service Provider (ISP). This information may be used by the web service to provide a user with information such as advertisements tailored to user preferences and choices in situ. "Click data" from the user's interaction with an advertisement, for instance, is assessed by advertisers to determine an ad's effectiveness and resultant closure of e-sales.

Websites often create other data from user information; for instance, using GPS and other sensors that collect location information and provide contextual real-time information and content feedback to the user. Many ecommerce organizations sell this content to external third-party enterprises for marketing and other purposes. This web content is dynamic, in part because it is user-generated and collected via multiple sensors and offered in multiple formats from text, photos, movies, and audio. User-based content exemplifies the extraordinary capacity of online service providers to provide personalized and customized experiences to individual visitors and to respond to the needs and preferences of the individual.

Semantic Content

[31] *See, e.g.*, LinkedIn, Cookies on the LinkedIn site (Sept. 26, 2012); *available at*: http://www.linkedin.com/legal/cookie_policy (last visited Jan. 15, 2015. *See also* Paul Baker, John C. Bricout, Nathan W. Moon, Barry Coughlan, & Jessica Pater, Communities of Participation: A Comparison of Disability and Aging Identified Groups on Facebook and LinkedIn, *Telematics and Informatics*, 30, 22-34 (2012).

[32] Facebook, Data Use Policy: Information We Receive About You, *supra*.

The web's inventor, Tim Berners-Lee, along with his colleagues, conceived of the web as a responsive (experiential) and machine-assisted "Semantic Web." The Semantic Web is a term that refers to a common structure for understanding and processing web content with the assistance of computer algorithms (rules for computer processing).[33] The conception of a Semantic Web draws on advances in natural language processing (NLP: computers drawing meaning from human language) and the ability of machines to recognize human speech and convert it to electronic text.[34]

The Semantic Web is a conceptual, machine-based framework that enhances access to and use of web content by diverse users. It does this by aiding in the understanding, organization, and interpretation of digital information. Intelligent web design conceived presently has not and may never replicate the intricate state of human knowledge processing and interaction; however, it has the promise to make web content accessible and usable (in its broadest form, universally usable) by persons with cognitive and other disabilities. The Semantic Web, along with other innovations, is poised to support the opportunity for web enjoyment to be individualized and contextualized in consideration of a user's preferences, skills, motivation, use of assistive technology (AT, such as screen reader software used by individuals with visual impairments), and myriad applications across desktop and mobile platforms, operating systems, and devices.

The capacity for semantic and user-based content to form *both* universal and individualized web content for persons with cognitive disabilities is further supported and

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[33] *See* W3C, *W3C Semantic Web Activity*; *available at*: http://www.w3.org/2001/sw/ (last visited Jan. 15, 2015). *See also* Lee Feigenbaum, Ivan Herman, Tonya Hongsermeier, Eric Neumann, & Susie Stephens, The Semantic Web in Action, *Scientific Amer.*, 297, at 90-97 (Dec. 2007).

[34] *See* Ross Lazerowitz, What is Natural Language Processing?, Information Space, School of Information Studies, Syracuse University (May 11, 2012); *available at*: http://infospace.ischool.syr.edu/2012/05/11/what-is-natural-language-processing/ (last visited Jan. 15, 2015).

increasingly delivered through Cloud Computing.[35] The Cloud, more precisely public and private Clouds of Clouds, allows web users ubiquitous access as they move through contexts and settings in their day and interact with web-enabled and interconnected devices. Through access to software stored in the Cloud, users are not inexorably tied to one access configuration, one location, one device, and one form of AT. Cloud computing enables a user to use AT and invoke preferences on any enabled device. No longer is the individual bound to the device that has AT or preferences installed; instead, they may enjoy the freedom of web content equality in an information technology ecosystem that undergoes continuous and dynamic change (e.g., updating of content), and which leverages the exponential power of computer data mining, search capacity, and semantic content generation and interpretation.[36]

Cognitive Disabilities and the Web

Besides attitudinal discrimination and technological barriers, there are structural reasons why people with cognitive disabilities face exclusion from the web. Poverty and lack of inclusive education, inadequate job training, and negative expectations limit the opportunity to access computer technology and services provided online. There are associated barriers facing those across the spectrum of disability in transportation, healthcare, social activities, and housing.

The particular examination of cognitive disability and web equality involves consideration of arguably the largest meta-group of people with disabilities.[37] Admittedly, it is

[35] *See generally* Amrish Chourasia, Dan Nordstrom, & Gregg Vanderheiden, State of the science on the Cloud, accessibility, and the future, *Universal Access in the Information Society*, 13(4), 483-95 (2014).

[36] *See also* Elizabeth Ellcessor, Captions On, Off, on TV, Online: Accessibility and Search Engine Optimization in Online Closed Captioning, *Television New Media*, 13: 329-52, at 329-30 (2012); Matt Huenerfauth & Pengfei Lu, Effect of spatial reference and verb inflection on the usability of sign language animations, *Universal Access in the Information Society*, 11:169–184 (2012).

[37] *See*, Frank La Rue, Report of the Special Rapporteur on the promotion and protection of the right to freedom of opinion and expression, United Nations, General Assembly, Human Rights Council, A/HRC/17/27 (May 16, 2011)at 6; Michael Schaten, Accessibility 2.0–New Approach to Web Accessibility for People with Cognitive and Intellectual Disabilities. In T. Amiel & B. Wilson (Eds.), *Proceedings of World Conference on Educational*

artificial to consider cognitive disability as a discrete category or condition, as cognition itself is linked to intellectual, sensory, emotional, and motivational characteristics and preferences.[38] Moreover, within cognitive disabilities there are individual disparities in access to and use of online services.[39] Nonetheless, there is a general lack of commitment to web equality for cognitive disability[40] despite the fact that technological advances for persons with cognitive disabilities complement and extend access strategies for those with visual, hearing, dexterity, and other conditions.[41] Many presupposed barriers to web equality not only are surmountable, but also are capable of resolution for individuals with diverse text- and print-related, intellectual, developmental, and neurological impairments.

Web content is produced by developers using HTML5 and Cascading Style Sheets 3 (CSS3) to present and format the information. Digital content is available on browsers used on desktop computers and mobile devices capable of multimedia presentation.[42] For web content to operate with a user agent (e.g., browsers, AT screen reader software), it must be machine-readable.[43] Computer code allows AT software to convert content to speech for screen reading functions and audio information to text for captioning.[44]

Multimedia, Hypermedia and Telecommunications, at 2868-2877 (2012). *See also* Kate Ellis & Mike Kent, *Disability and New Media*, at 7 (2011).

[38] *See, e.g.*, Michael D. Melnick, Bryan R. Harrison, Sohee Park, Loisa Bennetto, & Duje Tadin, A Strong Interactive Link between Sensory Discriminations and Intelligence, *Current Biology* 23, 1013–1017, at 1015 (2013)

[39] *See* Singanapalli Balaram, *UD Handbook*, *supra*, at 3.8.

[40] Elizabeth Ellcessor, Access Ability: Policies, Practices, and Representations of Disability Online, A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy (Communication Arts), University of Wisconsin-Madison, at 342 (2012).

[41] Ellcessor, *supra* (2012, dissertation) 342-43.

[42] For review, *see* Kevin Cullen, Lutz Kubitschke, David McDaid, Peter Blanck, William Myhill, Gerard Quinn, Patrick O'Donoghue, & Rune Halverson, Accessibility of ICT products and services to disabled and older people: Evidence-based analysis for a possible coordinated European approach to web accessibility, European Commission Information Society & Media Directorate, at 16 (2008); *available at*: http://ec.europa.eu/information_society/activities/einclusion/docs/access/comm_2008/coordinated_approach.doc (last visited Jan. 15, 2015). *See also* Jaka Sodnik, Matija Jekovec, Grega Jakus, & Sašo Tomaţič, The Future of the Web, *E-Society Journal: Research & Applications*, 2(1), 27-38 (July 2011).

[43] *See* W3C, Understanding Conformance (*available at*: http://www.w3.org/TR/UNDERSTANDING-WCAG20/conformance.html (last visited Jan. 15, 2015).

[44] *See* W3C, Understanding Conformance, *supra*.

People with cognitive disabilities benefit from these same mechanical and verbatim translations. As for blind individuals who use screen readers and deaf individuals who use captioning to access web content, people with cognitive disabilities profit from conversions that format text to audio and the reverse, as well as from the opportunity to use content presented in multiple communication modalities and to alter the viewing format of the information presented. This is the case where text alternatives for audio information are presented as captions and include important non-dialogue audio information such as sound effects.[45] The use of text to explain audio information that is integral to the plot helps individuals understand and note significant non-verbal information.

Sometimes, however, people with cognitive disabilities face additional challenges in the use of web content as expressed purely in text alternatives. A user's reading level, which is not a monolithic characteristic, affects comprehension and understandability, and the processing of text. Individuals with cognitive impairments who may have hearing impairments often have lower levels of linguistic capabilities especially if a gestural language such as American Sign Language (ASL) is their first language. Some individuals may require ASL, or other sign languages not based in English grammar to aid in web content usability and comprehensibility.[46] Consequently, within the domain of content transformation and modification, there is a need to consider an array of cross and co-existing characteristics.

Cognitive Disabilities

[45] *See* Captions (Live): Understanding SC 1.2.4, W3C; *available at*: http://www.w3.org/TR/UNDERSTANDING-WCAG20/media-equiv-real-time-captions.html (last visited Jan. 15, 2015). For an excellent discussion, *see* Ellcessor, *supra* at 342 (2012 article) ("visual cues, movements, expressions, and sounds that add to the tone or plot may be left out of online captioning, leaving deaf and hard-of-hearing users with a somewhat impoverished version of the original.").

[46] *See* Web Content Accessibility Guidelines (WCAG) 2.0, W3C Recommendation (Dec. 11, 2008), *supra*.

David Braddock and colleagues describe cognitive disabilities as "a substantial limitation in one's capacity to think, including conceptualizing, planning, and sequencing thoughts and actions, remembering, interpreting subtle social cues, and understanding numbers and symbols."[47] Cognitive disability covers conditions that may be based on the interaction of biology and environment over the life course—autism, intellectual and developmental disabilities, cerebral palsy, traumatic brain injury, brain injury acquired from aging, physiological and environmental conditions, post-traumatic stress disorder, dyslexia and learning disorders, and other conditions called print-related disabilities.[48] Often, these conditions coexist with sensory and physical impairments, with mental health conditions (e.g., depression and bipolar disorder), and have a diversity of causes, severity, and episodic presentation. Cognitive disability is affected separately and in combination by individual characteristics, environmental demands, and social supports.

The International Classification of Functioning, Disability and Health (ICF) is the World Health Organization's (WHO) framework for measuring health domains by use of functional capacity in a social context. Although not without its limitations, the ICF attempts to "'mainstream'[] the experience of disability and recognises it as a universal human experience."[49] The ICF approach reduces reliance on the medical model to adopt the social model of disability as applied in the ADA, the CRPD, and other disability rights laws. It

[47] David Braddock, Mary Rizzolo, Micah Thompson, & Rodney Bell, Emerging Technologies and Cognitive Disability, *J. Special Education Tech.*, 19(4), 49-56, at 49 (2004). *Id.* at 50 (citations omitted).

[48] *See, e.g.*, Autistic Self Advocacy Network (ASAN), About Autism*; available at*: http://autisticadvocacy.org/about-autism/ (last visited Jan. 15, 2015).

[49] *See* WHO, International Classification of Functioning, Disability and Health (ICF), *available at*: http://www.who.int/classifications/icf/en/ (last visited Jan. 15, 2015).

recognizes the importance of individual characteristics and the environment in defining disability.[50]

Although in instances cognitive disability may be associated with lower levels of intelligence as defined by standard tests and measures of daily functioning, this is not necessarily the case. Many individuals with cognitive disabilities have average and high levels of daily life functioning and intellectual skills. These individuals, whether with dyslexia or autism, may experience limitations in social and communication abilities due to a range of factors.[51] Moreover, contrary to popular belief, the majority of individuals with cognitive disabilities have conditions that are relatively mild and moderate.[52] Having said this, the experience of severe cognitive disability over the life course is not a presumption against the same opportunity for individual preference and choice in daily life, often with human and technological supports in certain circumstances. For people with some cognitive disabilities, autonomous choice takes on new meaning when "supported decision-making"[53] is bolstered by on-demand technological and web-based supports across the life cycle to maximize independence and fulfillment.[54]

Cognitive disabilities, therefore, represent an array of conditions and behaviors, which may be present at birth such as Down syndrome, acquired by a life event, or result from the

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[50] *See, e.g.*, K-R. Foley, P. Dyke, S. Girdler, J. Bourke, & H. Leonard, Young adults with intellectual disability transitioning from school to post-school: A literature review framed within the ICF, *Disability & Rehabilitation*, 34(20), 1747-1764 (2012); Borg et al., *supra* at 153.

[51] Referring to Autism Spectrum Disorder, which includes autistic disorder, Asperger Syndrome, and some pervasive developmental disorders. *See* E. Michael Foster & Erin Pearson, Is Inclusivity an Indicator of Quality of Care for Children With Autism in Special Education?, *Pediatrics*, 130, S179-85 (2012) at S180.

[52] Richard Hemp reviewed disability prevalence rates as reported in the World Report on Disability (2011); *available at*: http://whqlibdoc.who.int/publications/2011/9789240685215_eng.pdf (last visited Jan. 15, 2015). *See also* David Braddock, Richard Hemp, Mary C. Rizzolo, Emily Shea Tanis, Laura Haffer, Amie Lulinski, & Jiang Wu, *State of the States in Developmental Disabilities*, at 72 (2013) (hereinafter "States of the States").

[53] Peter Blanck & Jonathan Martinis, "The Right to Make Choices": National Resource Center for Supported Decision-Making, *Inclusion*, 3(1), 24-33 (2015).

[54] *See, e.g.*, Terry Carney, Participation and service access rights for people with intellectual disability: A role for law? *J. Intellectual & Developmental Disability*, 38(1): 59–69 (2013); Nina A. Kohn, Jeremy A. Blumenthal, & Amy T. Campbell, Supported Decision-Making: A Viable Alternative to Guardianship?, *Penn St. L. Rev.*, 117, 1111-57 (2012).

aging process. These conditions coexist with others. Individuals with Down syndrome, for instance, often have vision, hearing, and dexterity impairments.[55] For these reasons, generalizations across individuals are made with caution.

Cognitive Load

The process and rate involved with the delivery and transformation of electronic text generally determines the "cognitive load" that the information presents to an individual and that person's capacity to meaningfully acquire the information. Cognitive load is affected by how online tasks (websites) are designed and presented, as well as by individual characteristics.[56]

Generally, for all individuals, with and without disabilities, the proliferation of online devices, services, and multitasking has made cognitive load a crucial functional and performance issue of the information age.[57] In interacting with a web service, there is an expected distribution of cognitive load to be generated across the population of users. Unfortunately, web services typically are designed to be accessible and usable only to a limited range of the distribution of web users and often to an idealized "normal user" without consideration of cognitive disability, and the effects of other factors: environment, task, individual or collective interaction.

Disability antidiscrimination laws set out parameters to define when that "range of usage" is unfairly limited due to disability and hence discriminatory, which to date have been used in ADA actions primarily by the blind and deaf communities, and to a lesser extent by persons with cognitive disabilities. The requirement for reasonable modifications is meant to mitigate such

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[55] Ruimin Hu, Jinjuan Feng, Jonathan Lazar, & Libby Kumin, Investigating input technologies for children and young adults with Down syndrome, *Univ Access Inf Soc*, at 2; online 10.1007/s10209-011-0267-3 (2011). *See generally* Feng, Lazar, Kumin, & Ozok, *supra*.

[56] John Sweller, Paul Chandler, Paul Tierney, & Martin Cooper, Cognitive Load as a Factor in the Structuring of Technical Material, *J. Experimental Psychology: General*, 119(2), 176-192, at 176 (1990).

[57] *See* Tony Schwartz, Faced With Overload, a Need to Find Focus, Life@Work, *NY Times* (May 17, 2013) *available at*: http://dealbook.nytimes.com/2013/05/17/faced-with-overload-a-need-to-find-focus/ (last visited Jan. 15, 2015).

unfair restrictions, as long as they do not fundamentally alter the essence of the task or present an undue burden to the content producer. This general conception applies across disability types and functional severity, although cognitive disabilities by description directly implicate issues of cognitive load.

Although screen reader software and augmentative technologies may transform electronic content to aural presentation, for instance, the structure of the website, its navigability, and the complexity of its organization may independently affect comprehensibility and hence cognitive load.[58] Cognitive load or capacity is tested further when considering multimedia and dynamic (constantly updated) web content and interactions across platforms and interfaces. For example, cognitive disabilities may result in memory processing limitations that affect attention capabilities, which reduce the ability to perform certain sequenced web-based tasks.[59] Without the opportunity for alternatives, augmentations, sequenced feedbacks and supports, web use is effectively limited.[60]

Susan Feinberg and Margaret Murphy distinguish extraneous from intrinsic cognitive load in the development of online web educational materials.[61] Intrinsic cognitive load is

[58] *See, e.g.*, Yury Puzis, Yevgen Borodin, Faisal Ahmed, & I. V. Ramakrishnan, An intuitive accessible web automation user interface, *ACM*, Proceedings of the International Cross-Disciplinary Conference on Web Accessibility, 41-44 (2012).

[59] *Compare* Peter G. Fairweather, How Older and Younger Adults Differ in their Approach to Problem Solving on a Complex Website, *ACM ASSETS'08*, 67-72, at 67 (Oct. 13–15, 2008). *See also* Harper & Yesilada, *supra* at 16. *Id*. at 17; Iosif Klironomos & Julio Abascal, An Introduction to the Key Issues Relating to Accessible User Interfaces, *Cardiac-EU*, *available at*: http://www.cardiac-eu.org/user_interfaces/key.htm (last visited Jan. 15, 2015); John Gill and Julio Abascal, Accessible User Interfaces: Priorities for Research, *Cardiac-EU*; *available at*: http://www.cardiac-eu.org/deliverables/accessible_user_interfaces.htm (last visited Jan. 15, 2015); Julio Abascal, et al., Coordination Action in R&D in Accessible and Assistive ICT, CARDIAC—Coordination Action in R&D in Accessible and Assistive ICT, Deliverable D3.2: Trends on Inclusive User Interface Design, ADVANCE DRAFT REPORT (2012); *available at*: http://www.cardiac-eu.org/deliverables/d3-2.pdf (last visited Jan. 15, 2015).

[60] Fairweather, *supra* at 71.

[61] Susan Feinberg & Margaret Murphy, Applying Cognitive Load Theory to the Design of Web-Based Instruction, IPCC/SIGDOC '00 Proceedings of IEEE professional communication society international professional communication conference and Proceedings of the 18th annual ACM international conference on Computer documentation: Technology & teamwork, 353-60, at 354 (2000).

implicated in the processing of the substantive task at issue, while extraneous cognitive load is tapped when processing the presentation and format of web content.[62] Often, without the opportunity for effective modifications, online services make cascading demands on cognitive resources, creating an overload that makes extrinsic and intrinsic cognitive processing unnecessarily difficult. A website's presentational (navigational) format itself, as John Sweller and colleagues comment, may require considerable cognitive capacity.[63]

In principle, accessible and usable web design offers the opportunity to reduce *unnecessary* cognitive load, especially those substantive and presentational formats that are cumbersome or nonessential to the meaning of web content.[64] Of course, "unnecessary" cognitive load is a relative term and often depends on the perspectives of the content owner and producer, and the individual user.

Universal Design

When the opportunity for web content accessibility and usability is possible in the broadest sense, it trends towards "universal design" (UD), which enables participation by diverse users to the maximum degree possible.[65] UD is well beyond a minimum standard of accessibility.[66] As formulated by Ron Mace, it is "the design of products and environments to be

[62] Feinberg & Murphy, *supra* at 354. *See also* Puzis et al., *supra*, at 41.

[63] Sweller, *supra* at 176. *See also* Peter G. Fairweather, How Older and Younger Adults Differ in their Approach to Problem Solving on a Complex Website, *ACM ASSETS'08*, 67-72, at 67 (2008).

[64] *See, e.g.*, Shawn Lawton Henry, Shadi Abou-Zahra, & Judy Brewer, The role of accessibility in a universal web, In Proceedings of the 11th Web for All Conference, at 17, *ACM* (2014) ("'Universal design' is the process of creating products (devices, environments, systems, and processes) which are usable by people with the widest possible range of abilities, operating within the widest possible range of situations (environments, conditions, and circumstances). It is related to approaches called inclusive design, design for all, digital inclusion, and universal usability.") (citation omitted).

[65] *See, e.g.*, Judy Brewer, Accessibility of the World Wide Web: Technical and Policy Perspectives, *UD Handbook*, *supra*, at 33.2. For review, *see* Edward Steinfeld & Jordana Maisel, *Universal Design: Creating Inclusive Environments* (2012).

[66] *See* Jack L. Nasser, Are Retrofitted Wheelchair Entries Separate and Unequal?, *UD Handbook*, *supra*, at 41.2.

usable by all people, to the greatest extent possible, without the need for adaptation or specialized design."[67]

Rob Imrie has described UD as "making products *easier to use by reducing their complexity* and minimizing individuals' reliance on their physical and cognitive capabilities in interacting with them."[68] Reductions in task complexity, and conveyance of information via alternative channels of communication, reduce cognitive demands because capacity is effectively deployed and not expended on extraneous and multiple tasks and decision-making processes. Individual cognitive capacity may be increased with the use of universal adaptation and customization strategies (which may be thought of as individualized accommodations) that allow for tasks to be broken down into accessible and alternative components that are presented in different and multiple modalities.

In theory, UD exists when there is an equivalent opportunity for diverse individuals to use web content easily and comprehensibly, and within reasonable bounds. To paraphrase Imrie, it is an "avoidance of discriminatory design" in the technological world, with similar although less ubiquitous consequence in physical world design.[69] In practice, UD represents an aspiration to achieve equal and individualized participation regardless of disability and other human characteristics, as mediated by the unique characteristics of design, deployment, and integration with other related products and services.

Universal Design and Web eQuality

[67] *See* Rob Imrie, Universalism, universal design and equitable access to the built environment, *Disability & Rehabilitation*, 34(10): 873–882, at 873 (2012) (*citing* Ronald Mace, *Universal design: Housing for the lifespan of All People*, at 1 (1988)).

[68] Imrie, *supra* at 873. Jim Tobias, Universal design: Is it really about design? *Information Technology & Disabilities*, 9(1): 2-10 (2003).

[69] Imrie, *supra* at 875-76.

Without web equality, people with cognitive and other disabilities often "end up on the side of the [digital] divide with others who do not have access to or use technology."[70] This divide means a lack of access to comparable web content within and across multiple devices, platforms, and browsers (e.g., cross-platform compatibility).[71] The lack of functional and equivalent access to web content affects individuals across the spectrum of disability, as well as other "non-standard" web users. However, persons with cognitive disabilities are among those most profoundly affected by web content inequality. This is because, as a general proposition, *web equality for people with cognitive disabilities necessitates consideration of the meaning of web content*.

For instance, a web user with memory processing limitations likely will benefit (e.g., in terms of web accessibility and usability) from the opportunity to choose clearer and more concise language, which requires developers to consider the meaning of text-based web content they employ.[72] It is essential, therefore, to examine the intended purpose of web content and the design of the online service itself. Analysis requires an examination of the "equivalent enjoyment of web content" from the perspective of the content owners and designers, and the content users and their contextual environments.

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[70] Emily Shea Tanis, Susan Palmer, Michael Wehmeyer, Daniel K. Davies, Steven E. Stock, Kathy Lobb, & Barbara Bishop, Self-Report Computer-Based Survey of Technology Use by People With Intellectual and Developmental Disabilities, *Intellectual and Developmental Disabilities*, 50(1), 53–68, at 53 (2012).

[71] *See, e.g.*, La Rue, Report of the Special Rapporteur, *supra* at 4, 17. *See also* Tania Sebastian, 'Copyright World' and Access to Information: Conjoined *via* the Internet, *J. Intellectual Property Rights*, 17, 235-42, at 235 (2012); International Telecommunication Union (ITU) (hereinafter "ITU 2013") at 4 (May 2013); *available at*: http://www.itu.int/dms_pub/itu-d/opb/reg/D-REG-TTR.14-2013-SUM-PDF-E.pdf (last visited Jan. 15, 2015); Anthony Giannoumis, *supra* (2014); Anthony Giannoumis, The web as a site of intractable governance, in H.A. Caltenco, P-O. Hedvall, & Andreas Larsson (eds.) *Universal Design 2014: Three Days of Creativity and Diversity: Proceedings of the International Conference on Universal Design, UD 2014 Lund, Sweden*, Vol. 35, at 384 (June 16-18, 2014).

[72] I thank Anthony Giannoumis for this example.

Given the web's inclusive UD possibilities, it is fitting to aim for the development of a principled basis in law to web equality for persons with cognitive disabilities. This endeavor is not to divert attention for web equality from those with other disabilities; rather, it is to focus attention on a stigmatized and ostracized segment of individuals on the disability spectrum.[73] Moreover, the potential UD benefits of web content equality for those with cognitive disability transcend cognitive disability and apply to many other co-existing conditions, such as to sensory and mobility related impairments.

In *eQuality*, I proposed that for people with cognitive disabilities there may be at least two recognized meta-functional dimensions of web content equality: (1) *ease of use of web content*; for instance, in navigational and multimedia access and operability, and (2) *comprehensibility of web content*; for instance, in its understandability and substantive usability.[74] These dimensions of web content equality are not zero-sum choices nor independent of one another. Rather, they reflect a continuum of user experience that must be considered in context, with or without the use of AT and other supports.[75] They further are multi-dimensional concepts that are influenced by, and which affect individual preferences and differences, interaction with Semantic content on the web. Individuals with similar backgrounds and

[73] *See, e.g.*, Mark C. Weber, Disability Harassment, at 23-24 (2007). *See also* Elizabeth F. Emens, Disabling Attitudes: U.S. Disability Law and the ADA Amendments Act, *American Journal of Comparative Law*, 60, 220-33 (2012); Brigida Hernandez, Christopher Keys, & Fabricio Balcazar, Employer Attitudes Toward Workers with Disabilities and their ADA Employment Rights: A Literature Review, *J. Rehabilitation*, 66(4), 4-16 (2000); Nicole Ditchman, Shirli Werner, Kristin Kosyluk, Nev Jones, Brianna Elg, & Patrick W. Corrigan, Stigma and Intellectual Disability: Potential application of Mental Illness Research, *Rehabilitation Psychology*, 58(2), 206-16, 208 (2013); Shira Yalon-Chamovitz, Invisible access needs of people with intellectual disabilities: A conceptual model of practice. *Intellectual & Developmental Disabilities*, 47, 395–400 (2009).

[74] *See, e.g.*, Kasper Hornbaek, Current practice in measuring usability: Challenges to studies and research, *International J. Human-Computer Studies* 64 (2), 79-102, at 91 (2006).

[75] *See, e.g.*, Diana Ruth-Janneck, An Integrative Accessibility Engineering Approach Using Multidimensional Classifications of Barriers in the Web, In Proceedings of the International Cross-Disciplinary Conference on Web Accessibility, ACM, at 10-13 (2011). *See also* Katie Ellis & Mike Kent, *Disability and New Media*, at 26-27 (2011).

characteristics may prefer different ways to interact with web content in different situations and under varying conditions.[76]

Nevertheless, preference in web use does not necessarily equate with simplification (and is relative to context), and greater comprehensibility (or simplicity) is not necessarily synonymous with intellectual challenge and cognitive demands.[77] Although individuals with autism may experience differences in sensory and speech processing, and in sensitivities to the human voice itself, these characteristics in social communications are not necessarily tied to individual intelligence and capabilities.[78]

For many people with cognitive disabilities ease of use and simplicity directly tie to the nature of web content accessibility and usability.[79] Melissa Dawe Schmidt conducted an ethnographic study with young adults with cognitive disabilities.[80] The study, entitled "Desperately Seeking Simplicity," found overwhelmingly that these participants desired developers to "keep it small and simple, please!", and among the most desirable features were ease of use, functionality, and portability. The opportunity for ease of use and comprehensibility was among the central means for sustaining interest.[81]

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[76] *See* Fairweather, *supra* at 71.

[77] Micah Mazurek, Paul Shattuck, Mary Wagner, & Benjamin P. Cooper, Prevalence and Correlates of Screen-Based Media Use Among Youths with Autism Spectrum Disorders, *J. Autism & Dev. Disorders* (published online Dec. 2011). *See also* Cecilia Li-Tsang, Susanna Yeung, Chetwyn Chan & Christina Hui-Chan, Factors affecting people with intellectual disabilities in learning to use computer technology, *International J. Rehabilitation Research*, 28(2), 127–133, at 132 (2005); Daniel Davies, Steven Stock, & Michael Wehmeyer, Enhancing independent internet access for individuals with mental retardation through use of a specialized web browser: A pilot study, *Education and Training in Mental Retardation and Developmental Disabilities*, 36(1), 107-113 (2001); Alex Wong, Chetwyn Chan, Cecilia Li-Tsang, & Chow Lam, Competence of people with intellectual disabilities on using human–computer interface, *Research in Developmental Disabilities*, 30; 107–123 (2009).

[78] *See, e.g.*, Daniel A. Abramsa, Charles J. Lynch, Katherine M. Cheng, Jennifer Phillips, Kaustubh Supekar, Srikanth Ryali, Lucina Q. Uddin, & Vinod Menon, Underconnectivity between voice-selective cortex and reward circuitry in children with autism, *Proceedings of the National Academy of Sciences*, at 4 (2013) (citations omitted).

[79] *See* Gregg Vanderheiden, Fundamental Principles and Priority Setting for Universal Usability, CUU '00 Proceedings on the 2000 conference on Universal Usability, *ACM*, 32-38, at 36 (2000).

[80] Melissa Dawe, Desperately Seeking Simplicity: How Young Adults with Cognitive Disabilities and Their Families Adopt Assistive Technologies, *ACM, CHI 2006*, 1143-1152, at 1143, 1147-49 (Apr. 22–27, 2006).

[81] Dawe, *supra* at 1148.

For web developer Jamie Knight, "cognitive accessibility" (and usability) means that individuals with cognitive and other disabilities have the same opportunity to receive, process, and act on online information, as do others without such conditions.[82] Cognitive accessibility, according to Knight, is related to functional dimensions affecting reading comprehension, visual and content load capacity, and web layout.[83]

Towards Web eQuality

By the year 2040, at the fiftieth anniversary of the ADA and the thirty-second anniversary of the CRPD, will a generation individuals with cognitive disabilities be engaged fully and equally with the web? More and more students with cognitive disabilities will have attended post-secondary education and be seeking to enter the competitive workforce.[84] By that time, the number of persons over age 65 in the U.S. will have doubled, and many people will use the web to support independence in all aspects of their daily lives.[85]

Fortunately, there is a growing body of expertise in accessibility to meet the increasing demand to make web technologies accessible. There is now an International Association of Accessibility Professionals (IAAP): "a global community for people and organizations working in accessibility to share expertise and resources, support one another's work, and follow

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[82] Jamie Knight, Cognitive Accessibility 101 - Part 1: What is Cognitive Accessibility (2015); *available at*: http://jkg3.com/Journal/cognitive-accessibility-101-part-1-what-is-cognitive-accessibility (last visited Mar. 13, 2015).

[83] Jamie Knight, Cognitive Accessibility 101 - Part 2: How it effects me & the tools I use; (2015); *available at*: http://jkg3.com/Journal/cognitive-accessibility-101-part-2-how-it-effects-me-the-tools-i-use (last visited Mar. 13, 2015).

[84] *See* Association of Research Libraries, Report of the ARL Joint Task Force on Services to Patrons with Print Disabilities, at 6, 14 (Nov. 2, 2012).

[85] *See* Braddock, et al., *supra* (2012), at 82 (citing U.S. Census Bureau, 2012). *See also* Peter Blanck, The First "A" in the ADA: And 25 More "A"s Towards Equality for Americans with Disabilities, *Inclusion* (forthcoming, 2015).

developments in this fast-changing field."[86] This sharing of resources and standards of practice is an important part of building universal web equality.

Optimistically, before too long, binary views of web accessibility and usability will be relics of the past. Instead of "one size fits all" web content for standard users, there will be opportunities for auto-personalization "one size fits one"[87] web content, reflecting a globalized alignment of the web as an enabler of human rights as envisioned by the CRPD.[88] Still, even with such technological optimism, there will be complexities to the mass customization of web content, such as the need for developers to maintain design simplicity and ease of use with the proliferation of niche technologies, which is where open source ecosystems that promote universal access and use also will come into play.[89]

Hardware and software architectures will coexist with smart environments—homes, schools, libraries, workplaces, health care centers. Embedded ambient intelligence will converge in Cloud infrastructures, and web content will be semantically responsive and intuitive, and less design and code dependent.[90] Content will be available in real-time on-demand services on and

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[86] Rob Sinclair, Microsoft Will Help Launch a New Association for Accessibility Professionals (December, 17, 2013); *available at*: http://blogs.msdn.com/b/accessibility/archive/2013/12/17/microsoft-will-help-launch-a-new-association-for-accessibility-professionals.aspx (last visited Jan. 15, 2015).

[87] *See* Jutta Treviranus, You Say Tomato, I Say Tomato, Let's Not Call the Whole Thing Off: The Challenge of User Experience Design in Distributed Learning Environments, *eLiterate* (July 1, 2008); *available at:* http://mfeldstein.com/you-say-tomato-i-say-tomato-let%E2%80%99s-not-call-the-whole-thing-off-the-challenge-of-user-experience-design-in-distributed-learning-environments/ (last visited Jan. 15, 2015).

[88] *See* Gary Heil, Tom Parker, & Deborah C. Stephens, *One Size Fits One: Building Relationships One Customer and One Employee at a Time* (1999); Jordan Novet, The web isn't one-size-fits-all anymore, so the as-a-service world just keeps on growing, *Gigacom* (May. 31, 2013); *available at*: http://gigaom.com/2013/05/31/the-web-isnt-one-size-fits-all-anymore-so-the-as-a-service-world-just-keeps-on-growing/ (last visited Jan. 15, 2015); WebAim, Design Considerations. One Size Fits All? (2013) *available at*: http://webaim.org/articles/design/ (last visited Feb. 16, 2015).

[89] *Compare* One Size Fits One: Tailoring Technology to Consumer Needs, Knowledge@Wharton (Apr. 20, 2005); *available at*: http://knowledge.wharton.upenn.edu/article.cfm?articleid=1178 (last visited Jan. 15, 2015).

[90] *See* Tim Berners-Lee, Weaving the Web, at 159, 168 (1999); G. Liotta, E. DiGiacomo, R. Magni & F. Corradi, Web Solutions for Rehabilitation and Daily Life, in *Assistive Technology Assessment Handbook*, Stefano Federici & Marcia Scherer (Eds.), at 366 (2012); Rich Picking, Alexia Robinet, John McGinn, Vic Grout, Roberto Casas, & Ruben Blasco, The Easyline+ project: evaluation of a user interface developed to enhance independent living of elderly and disabled people, *Univ Access Inf Soc*, 11: 99–112 (2012).

in the person (through wearables and nanorobotics[91]) in homes (through automation and appliances[92]), schools (with online teaching materials) and workplaces (with job training and advancement programs). The web will provide options for collaborative crowd-sourced feedback and services for individuals, groups, and communities from the management of health care and financial transactions, to emergency preparedness for natural and manmade disasters. Digital cooperatives not only will enhance the sharing and development of knowledge, but also will be central to the management and growth of a free and open information society.[93]

Functional eQuality

Although aspects of online solutions increasingly will be tailored for all persons, the WCAG 2.0 and other standards also will have preferably trended towards functional use criteria for universal applicability.[94] Discussion will not be one of whether online services must be universally usable versus disability-specific. Consider Elizabeth Ellcessor's view that "[e]quality does not require uniformity";[95] nor need it result in mediocrity. Rather, *personalization as an option will be offered across a range of digital inclusive environments*.

[91] In addition, 3-D printers will have new benefits for consumers, for example, to aid in development of products and services that enhance participation by persons with disabilities in daily life. *See, e.g.*, Jacqueline Mroz, Hand of a Superhero: 3-D Printing Prosthetic Hands That Are Anything but Ordinary (NY Times Feb. 16, 2015); *available at*: http://www.nytimes.com/2015/02/17/science/hand-of-a-superhero.html?hp&action=click&pgtype=Homepage&module=photo-spot-region&region=top-news&WT.nav=top-news&_r=0 (last visited Feb. 17, 2015).

[92] *See* Evan Brown, Best practices for providers of goods and services on the Internet of Things; *available at*: http://blog.internetcases.com/2015/01/27/best-practices-for-providers-of-goods-and-services-on-the-internet-of-things/ (2015) (last visited Feb. 15, 2015) (company practice need not impede device usability).

[93] *See* Gregg C. Vanderheiden, Jutta Treviranus, Maria Gemou, Evangelos Bekiaris, Kasper Markus *The Evolving Global Public Inclusive Infrastructure (GPII)* in Universal Access in Human-Computer Interaction. Design Methods, Tools, and Interaction Techniques for eInclusion, Lecture Notes in Computer Science Volume 8009, 2013, pp 107-116. For the Prosperity4All project, I serve as legal advisor on international copyright issues and on the connection to Prosperity4All services and software services and guidelines for their use.

[94] Simon Harper & Yeliz Yesilada, Chapter 11—Web Accessibility: Current Trends, 172-90, at 175, in *Handbook of Research on Personal Autonomy Technologies and Disability Informatics* (ed. Javier Pereira) (2011).

[95] Ellcessor, *supra* at 346 (2012 article). *Id.* at 347. *See also* Stein et al., *supra* (2014).

Ideally, corresponding concepts of accessibility and usability will fade, replaced by a paradigm shift towards innovation in web content regardless of disability. The inventor of the web, Tim Berners-Lee, understood this centrality of choice and cohesiveness to web content equality when he said that its "flexibility and openness" make it possible "to build services and applications that are truly accessible for people with disabilities, as well as [for] people who need to transform content for purposes other than that for which it was originally intended."[96]

To "transform content for purposes other than that for which it was originally intended" is to provide meaningful and autonomous choice in the web ecosystem. It is to reach diverse audiences, without stifling innovation and creativity, without trampling on individual privacy, and by spurring market growth and consumer loyalty, and importantly, participation in one's community.

Before there was established law on the right to the web, Berners-Lee said:

> we have to be careful that [the web] allows for a just and fair society. The Web must allow equal access to those in different economic and political situations; to those who have *physical or cognitive disabilities*; those of different cultures; and those who use different languages with different characters that read in different directions across a page.[97]

A number of coming technologies will further support an inclusive web. Semantic web content will provide a basis for establishing a Cloud-driven Semantic Web, a "social-semantic" web[98] that will provide the opportunity for contextually-aware multichannel communications, using facial expressions and tone of voice, eye blinks and movements, gestures, and sign languages.[99]

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[96] *See* Timothy Berners-Lee, Testimony Before the United States House of Representatives Committee on Energy and Commerce Subcommittee on Telecommunications and the Internet Hearing on the "Digital Future of the United States: Part I—The Future of the World Wide Web", at 1, 4 (Mar. 1, 2007).

[97] Berners-Lee, *supra* at 165 (emphasis added).

[98] Mark Greaves & Peter Mika, Editorial, Semantic Web and Web 2.0, *Web Semantics: Science, Services and Agents on the World Wide Web*; 6, 1-3, at 1 (2008).

[99] *See, e.g.*, Aleksandra Krolak & Paweł Strumiłło, Eye-blink detection system for human–computer interaction, *Univ. Access Inf. Soc*, 11:409–419, at 418 (2012). *See, e.g.*, Whistle (2013) (web-based monitor for dogs); *available at*: http://www.whistle.com/company/ (last visited Jan. 15, 2015); Mike Hendricks & Roxie

Such breakthroughs will facilitate mass interoperability and personalization among the components of the entire online ecosystem.[100] Legal and policy regimes domestically and transnationally will need to keep pace with these advances to support harmonization and innovation in web content ownership, licensing and open source agreements, and security and privacy of user agents built into the systems and accessed externally by web interfaces and the Cloud.[101] These systems will experience constant updating, given dynamic operating schemes and websites, and the means to aggregate and summarize web content.

These imaginings follow on existing automation capabilities to simplify user interfaces. Yury Puzis and his colleagues comment that screen reader software presently allows users to develop their own macros for automation of certain tasks, such as to look up unknown words in a dictionary.[102] These researchers, and others, are examining the means to automate web content to reduce unnecessary cognitive load and to maximize cognitive flourishing. The release of Microsoft's Windows 8, and its built-in AT, hinted at some of the future opportunities for personalization of web content.[103] For people with cognitive and other disabilities, consider its "Ease of Access Center," with customizable commands.[104]

Hammill, New Devices Mind Pets While Owners Are Away, NY Times (Sept. 11, 2013) (listing products similar to Whistle); *available at*: http://www.nytimes.com/2013/09/12/technology/personaltech/new-devices-mind-pets-while-owners-are-away.html?src=dayp&_r=1& (last visited Jan. 15, 2015).

[100] Denis Anson, Email to author and attached memorandum (Mar. 20, 2013) (available from author).

[101] In 2013, NIDRR issued the proposed research priority "Inclusive Cloud and Web Computing" (Fed. Reg., Vol. 78, No. 10, at 2919-23 (Jan. 15, 2013). *See also* Anson Memo, *supra*.

[102] Puzis et al, *supra* at 42.

[103] Accessibility in Windows 8 (2013); available at: http://www.microsoft.com/enable/products/windows8/ (last visited Jan. 15, 2015). *Compare*, Anirban Lahiri, Is Windows 8 a Step Back in Accessibility?, SSB Bart Group (Oct. 31, 2012) *available at*: https://www.ssbbartgroup.com/blog/2012/10/31/is-windows-8-a-step-back-in-accessibility/ (last visited Jan. 15, 2015); Mardon Erbland How good are Windows 8 accessibility features for the blind?, betanews (2012); *available at*: http://betanews.com/2012/03/02/how-good-are-windows-8-accessibility-features-for-the-blind/ (last visited Jan. 15, 2015).

[104] *See, e.g.*, Jessica Hullman, Nicholas Diakopoulos, & Eytan Adar, Contextifier: Automatic Generation of Annotated Stock Visualizations, *ACM CHI 2013* (Apr. 27–May 2, 2013); David McNaughton & Janice Light, The iPad and Mobile Technology Revolution: Benefits and Challenges for Individuals who require Augmentative and Alternative Communication, *Augmentative and Alternative Communication*, 29(2), 107-16, at 109 (2013)at 110.

Human–computer interaction ("HCI") researchers are developing on-demand analytics for web content that incorporate individual learning, and reading histories and styles. IBM researcher Eser Kandogan is developing "just-in-time descriptive analytics" using means in real-time "to help users easily understand the structure of data as seen in visualizations."[105] Kandogan's image-to-text analytics identify informational trends automatically and are able to "*decrease the cognitive load on users by automatically explaining structure in real-time as they interact*."[106] The annotation model is user-driven at the time of interaction to enhance understanding. With a similar outcome in mind, Bill Gates and his co-inventors have submitted a patent filing for a technology application to autogenerate video from electronic text.[107] These advances will enhance web content equality through the integration of automated annotation and summarization techniques with semantic, perceptual, cognitive, communication, lingual and features based on personal preferences and capabilities, all in real-time.

The W3C and other groups are developing complementary tools to support the inclusive web, such as the Web Ontology Language (OWL V.2), for web applications to process content.[108] Ontologies are vocabularies of web content—terms, words, microformats, and metadata—organized by rules and their relationships to other terms.[109] These capabilities, when combined with collective and machine-based knowledge from cataloguing and search

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[105] *See* Eser Kandogan, Just-in-Time Annotation of Clusters, Outliers, and Trends in Point-based Data Visualizations, *IEEE TVCG*, 73-82, at 73 (2012).

[106] Kandogan, *supra* at 73-74.

[107] *See* Victoria Slind-Flor, Bill Gates, HP, Warner Music, Deere: Intellectual Property, *Bloomberg News* (Aug. 20, 2013); *available at*: http://www.businessweek.com/news/2013-08-20/bill-gates-hp-warner-music-deere-intellectual-property (last visited Jan. 15, 2015).

[108] *See* W3C, OWL Working Group; *available at*: http://www.w3.org/2007/OWL/wiki/OWL_Working_Group (last visited Jan. 15, 2015).

[109] *See* W3C, OWL 2 Web Ontology Language Document Overview, W3C Recommendation 27 October 2009; *available at*: http://www.w3.org/TR/owl2-overview/ (last visited Jan. 15, 2015). *See also* Anupriya Ankolekar, Markus Krotzsch, Thanh Tran, & Denny Vrandecic, The two cultures: Mashing up Web 2.0 and the Semantic Web, *Web Semantics: Science, Services and Agents on the World Wide Web*, 6, 70–75, at 71 (2008).

capabilities, offer personalized opportunities for people to interact with the web. The late disability leader and historian Paul Longmore pointed out that critics of disability rights laws complain that people with disabilities "want it both ways;" that is, to have equality and full integration along with the opportunity for "special treatment" such as accommodations.[110] In the advancing world of the web, both are possible, not only for the disabled, but for all. The full and equal enjoyment of the web means the opportunity for equivalent and comparable engagement, but not necessarily identical usage.

Raising the Floor (Rft) for People with Cognitive and Other Disabilities

Cloud-based educational, rehabilitation, job training, financial, and leisure programs and services increasingly act as daily life supports for individuals with an array of cognitive disabilities.[111] The Cloud has the potential to seamlessly augment communication, memory and concentration skills in real-time by aiding in customization and operability across digital devices, browsers, and systems.[112]

The Raising the Floor (RtF) Consortium, and its partners engaged with the Global Public Inclusive Infrastructure (GPII) initiative and projects such as Cloud4All and Prosperity4All,[113] are developing a real-time Cloud-based ecosystem to provide customized user profiles to

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[110] Paul K. Longmore, Disability Policy and Politics: Considering Consumer Influences, *J. Disability Policy Studies*, 11: 36-44, at 43 (2000).

[111] S*ee generally* Blanck, *eQuality*, *supra*.

[112] *See, e.g.,* National Council on Disability. *The Power of Digital Inclusion: Technology's Impact on Employment and Opportunities for People with Disabilities* (NCD, 2011). The U.S. Department of Defense also uses online services for veterans and their families to address disability stigma and post-deployment work adjustment. *See, e.g.,* After Deployment, http://www.afterdeployment.org/ (last visited Jan. 15, 2015) (programs for PTSD emphasize online ease of use and comprehensibility).

[113] *See* Raising the Floor, *Mission and Beliefs* (RtF); *available at*: http://raisingthefloor.org/about/mission (last visited Jan. 15, 2015). Launched in 2010, RtF was conceived by Gregg Vanderheiden during his term as co-chair and editor of WCAG 2.0. RtF members are individuals and organizations who believe the right to the web is "no longer optional" and access and usability solutions must be made universalized for persons with cognitive disabilities. I am founding member and President of RtF USA, which is a not-for-profit organization based in Washington, D.C.

enhance online access for people with cognitive and other disabilities.[114] The goal is to provide auto-personalized options for users to simplify operations and interfaces, and for individuals with disabilities who use assistive technologies (AT: e.g., screen reader software) to make web operations adaptable and compatible across devices. The overarching aim of these projects is to create the means for individuals to effectively use any digital device and system encountered in their daily activities. This objective is furthered by use of open source and commercially viable Cloud-based technologies that support web equality.[115]

To approach these goals, Rtf is developing a MasterList (database) of strategies designed to support universal solutions for web content equality.[116] The majority of the MasterList entries are directly applicable to individuals with cognitive disabilities; for example, the MasterList includes Cloud-based solutions designed for:

- Reading text aloud and highlighting functions for those who use screen readers to enhance content comprehension for persons with cognitive disabilities.
- Reorganizing and simplifying text with the use of customized style aids to help in interoperability with AT used by those with print disabilities.
- Reorganizing text in navigation menus and to develop consistent and contextual navigation controls, page layout, labels and icons, notices within and across pages to aid persons with memory impairments.
- Audio enhancements to reduce background noise and adjust pace and volume of audio to aid in comprehension by persons with Autism.

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[114] *See* Global Public Inclusive *Infra*structure (GPII); *available at*: http://gpii.net/index.html (last visited Jan. 15, 2015). *See also* Gregg Vanderheiden & Jutta Treviranus, *Creating a global public inclusive infrastructure*. Proceedings of the 6th international conference on Universal access in human-computer interaction: design for all and eInclusion—Volume Part I; Orlando, FL. 2022652, 517-26 (2011).

[115] The W3C is examining other ways users may maintain personal security, with authentication systems embedded in online services. *See* W3C, *User Identity on the web Community Group*, W3C.org; *available at*: http://www.w3.org/community/w3Id/ (last visited Jan. 15, 2015).

[116] *See, e.g., Who We Are*: *The People and Organizations that Make Up the RtF Initiative*, Raising the Floor (listing members); *available at*: http://raisingthefloor.org/about/who (last visited Jan. 15, 2015). *Solutions MasterList*, Raising the Floor; *available at*: http://raisingthefloor.org/projects/masterlist/currentmasterlist (last visited Jan. 15, 2015).

- Accessible authentication (security) methods for online use to help those with learning disabilities.

- Functions for pronunciation and help support on demand, and the ability to correct speech-synthesis pronunciations to help those with TBI.

- Customization by ability to reorganize and translate content, and choice to modify background color, contrast, magnification, and font adjustments to facilitate reading for those with dyslexia.

- Simplification and customization of pages and browsers in different modes of presentation, and to translate and retrieve content in simplified language and symbols.

- Adjustable time limits and functions that may be paused for reading, listening, and required actions for those with intellectual and developmental disabilities.

There are other solutions to supplement web content with automated tools and AT. These include development of customized dictionaries and glossaries in multiple languages, and usage profiles to share with others, as well as customized cues for prompting use and function, and real-time assistance. Solutions allow for customize keyboard, mouse, and voice controls for text and input entry, along with use of specialized “hotkeys,” shortcuts to simplify actions. Error prevention, correction, and recovery solutions are provided. Privacy and safety functions allow for automatic and pre-set assessments of website credibility and authenticity for trusted websites. Security functions are presented to support ease of use and comprehensibility for a range of users in ecommerce, social media, and gaming, and multichannel support functions are suggested to organize and adjust the amount of information presented. The use of GPS navigation provides for wayfinding, communication, and use of mobile devices in real time as well as to aid in information processing and comprehensibility of content.

The RtF MasterList furthers the design of new web tools and infrastructure to enhance customized, affordable and cost-effective ways to present web content.[117] The RtF, along with the GPII, with activities operating within the larger digital ecosystem, aims to enable individuals with diverse backgrounds and cognitive skills to learn about and select strategies to create and access their personalized profiles stored in the Cloud.[118] The preferences are to be available on-demand, across platforms and devices, and aimed at spurring innovation in proprietary and open source web products and services. Leading web researcher Gregg Vanderheiden believes that such a paradigm shift is essential because "access to the Internet and its information, resources and services is no longer optional."[119]

The RtF and other projects are helping to make online technologies universally available to those with cognitive and other disabilities, which also will benefit those with lower reading skills and digital literacy, print-related, lingual, and aging-related barriers. These efforts build on the principles set out in the ADA and the CRPD to promote web equality as a principal enabler for full and equal participation, and active citizenship, across life circumstances.[120]

Semantic Web and the "Internet of Things"

According to Anthony Giannoumis, *eQuality's* "idea that semantic web content provides a means for achieving universal design in practice *is the missing link* between what we know and understand about accessibility and what we want to achieve with universal design."[121] In this

[117] *See* Raising the Floor Projects, http://raisingthefloor.org/projects (last visited Jan. 15, 2015).

[118] *See generally* Blanck, *eQuality*, *supra*. The GPII proposes Cloud-based user profiles (Personal Needs and Preferences (PNP) files) to enhance web use for people disabilities. *See* Global Public Inclusive Infrastructure; *available at*: http://gpii.net/index.html (last visited Jan. 15, 2015).

[119] *See* Vanderheiden & Treviranus, *supra*, at 517.

[120] *See also* G3ICT, ITU. *e-Accessibility Policy Toolkit for Persons with Disabilities: A Joint ITU/G3ict Toolkit for Policy Makers Implementing the Convention on the Rights of Persons with Disabilities.* [cited 2014 Mar. 22]; *available at*: http://www.e-accessibilitytoolkit.org/toolkit/annexes/Text%20of%20the%20Convention#expression (last visited Jan. 15, 2015).

[121] Anthony Giannoumis email correspondence to author (Feb. 15, 2015). *See also* G. Anthony Giannoumis, Articulating a Right to the Web for Persons with Cognitive Disabilities: Review of Peter Blanck,

chapter, I have tried to clarify this view and extend its centrality as the Semantic Web and the Internet of Things ("IoT"; e.g., web-activated household appliances) continue to evolve. As Giannoumis has suggested, one main consideration regarding the principles of accessibility, usability, and universal design going forward in relation to the IoT is that new and non-traditional platforms and web interfaces will become even more ubiquitous, yet increasingly personalized.

At the present time, we are experiencing an inflection point at which web developer and service provider norms and standards are shifting from primarily user-driven interfaces to the IoT's hybrid of user-intelligent machine interfaces. For example, rather than programming a website to interact with particular assistive technology, a developer will program everyday household appliances to interact with Cloud-based auto-personalization services.[122] The objective is to allow users with diverse backgrounds and skills, and under varying environmental conditions, to access the IoT through the platforms and input devices the *user* chooses, anyplace and anytime.

The shift towards the ubiquitous IoT, in user practice and from a developer organizational perspective, should reduce the need for prescribed web content design standards. Rather, the pendulum of "responsibility" may swing from user-interaction designers and developers to international collaboratives aimed at maximizing innovative machine-to-machine interfaces, which the IoT envisions. However, despite attempts at harmonization, there are no globally

eQuality: The Struggle for Web Accessibility by Persons with Cognitive Disabilities, in *Universal Access in the Information Society* (2015, in press) (emphasis added).

[122] Again, I thank Anthony Giannoumis for this example.

accepted norms and values to spur such efforts, which is why the web and the IoT risk fragmentation.[123]

Section 508 Refresh: Missed Opportunity in the U.S.?

In 2015, the U.S. Architectural and Transportation Barriers Compliance Board ("Access Board") proposed an update or "refresh" of the accessibility guidelines and standards for electronic and information technologies, including web services, under Section 508 of the Rehabilitation Act of 1973 and Section 255 of the Communications Act of 1934.[124] According to the Access Board, this effort is in response to "a technological revolution" in web design and usage driven technologies, services, and products.[125] For instance, in the fifteen years since adoption of the prior Section 508 standards, "smart" mobile phones and tablets have overtaken desktop computers as the primary means for information technology communications.[126]

The proposed rules replace the current "product-based approach with requirements based on functionality" to ensure accessibility and usability for people with disabilities in "hardware, software, *electronic content*, and support documentation and services."[127] They incorporate the WCAG 2.0 and make them applicable to web content and to web electronic documents and software.[128] The Access Board identifies as among the potential beneficiaries of its proposal

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[123] *See, e.g.,* Colin Gibbs, Challenges and opportunities abound in the fragmented IoT, Gigaom Research (Oct. 8, 2014); *available at*: http://research.gigaom.com/2014/10/challenges-and-opportunities-abound-in-the-fragmented-iot/ (last visited Feb. 15, 2015) (fragmented operating systems in the IoT).

[124] *See* U.S. Access Board, Proposed Information and Communication Technology (ICT) Standards and Guidelines, to be published in the Federal Register at 36 CFR Parts 1193 and 1194 [Docket No. ATBCB-2015-0002] RIN 3014-AA37 (Feb. 18, 2015); *available at*: http://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh/news-release (last visited Feb. 20, 2015).

[125] *See* U.S. Access Board, Proposed Information and Communication Technology (ICT) Standards and Guidelines, *supra* at Executive Summary.

[126] *Id.*

[127] *Id.*

[128] *Id.* ("electronic content would have to be accessible, with "content" encompassing all forms of electronic information and data. … [with] real-time text (RTT) functionality. … The guidelines define "usable" as providing access to information about how to use a product, and direct that instructions, product information, documentation, and technical support for users with disabilities"). *Id.* at V. Major Issues (A. Electronic Content:

people who are deaf and hard of hearing, for instance, to have faster and enhanced natural language communications. It also acknowledges that the proposal is intended to help improve online services and supports for individuals with visual impairments.

The Board does not take the opportunity to address those particular web accessibility and usability issues facing individuals with cognitive disabilities. It does acknowledge, however, that aspects of the proposed functional performance criteria relate to cognitive functioning; for example, in regard to improved functionality for web application timing adjustments, and for blinking, scrolling, and auto-updating information to aid in comprehension.[129] The earlier referenced RtF MasterList identifies many of these same considerations.[130]

It is curious why the Access Board chose not to include specific guidelines for functional performance criteria relating to cognitive disabilities.[131] The Board's stated reason is that its Advisory Committee was not able to reach consensus on requirements for web accessibility for

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proposed rule would delineate "scope of covered electronic content, as well as specifying concrete, testable, technical requirements to ensure the accessibility of such content. … all covered electronic content would be required to conform to WCAG 2.0 Level A and Level AA Success Criteria … . [including] public-facing content—which encompasses electronic information and data made available by agencies to members of the general public).

[129] *See, e.g.*, U.S. Access Board, Proposed Information and Communication Technology (ICT) Standards and Guidelines, *supra* at V. Major Issues, B. WCAG 2.0 Incorporation by Reference ("proposed standards would provide a single set of requirements for websites, documents, and software. … New requirements in WCAG 2.0 also address gaps in the existing 508 Standards. Examples include: a requirement for a logical reading order, the ability to resize text, and the ability to turn off background audio that might interfere with comprehension and screen reading software."). *Id.* at VI. Section-by-Section Analysis, Functional Performance Criteria ("Timed Response. … where a timed response is required, ICT would have to alert the user visually, as well as by touch or sound. … . The intent of this section is to afford people with certain disabilities—namely, those relating to manual dexterity, *cognitive disabilities, or otherwise affecting response time*—additional time to complete a task, if needed.") (emphasis added). *Id.* at VI. Section-by-Section Analysis, D. Functional Performance Criteria ("Captioning is critical for persons with hearing impairments *to use and understand information presented* in a video format.") (emphasis added); *Id.* Functional Performance Criteria ("[S]pecifications for ICT documentation in terms of accessibility and compatibility features that assist users with disabilities. Such documentation includes installation guides, user guides, online support, and manuals that describe features of a product and how it is used. … [B]ecause some users with disabilities have complained about a lack of information available *to help them understand the accessibility and compatibility features of some ICT*.") (emphasis added).

[130] *See eQuality*, *supra* at 167-74.

[131] *Id.* ("The existing 255 Guidelines provide a criterion for at least one mode of operation that minimizes cognitive skills required of the user [], while the existing 508 Standards have no parallel provision. Such a criterion has not been included in the proposed rule on the advice of the Advisory Committee, which recommended deletion of this criteria pending future research.").

individuals with cognitive disabilities, and that there was a lack of adequate research on related metrics to verify functional conformance.[132] Yet, there are recognized metrics useful for assessing functional performance, in the WGAG 2.0 and elsewhere, for individuals with cognitive disabilities and older adults. Many such criteria may be derived from extant research and are relevant to individuals with visual, hearing, and dexterity conditions, as referenced by the Board.[133]

An additional objective of the Access Board's 508 refresh is to harmonize the existing Section 508 and 255 standards with corresponding guidelines in the global communications and technology markets to spur international advancement and innovation.[134] The Access Board references that in 2013, the European Commission published its draft Mandate 376 standards for "Accessibility requirements for public procurement of ICT products and services in Europe,"[135] which was completed in 2014 and subsequently adopted by the major European standards organizations.[136] Mandate 376, like the 508 guidelines, provides technical specifications for the

[132] *Id.* at VI C. 255 ("In the 2010 ANPRM, the Board followed this recommendation and proposed removal of the existing functional performance criterion specifically directed to cognitive disabilities. The Board did, however, seek public input on whether other proposed functional performance criteria adequately addressed cognitive impairments … Some commenters believed that cognitive disabilities were already sufficiently addressed through other criteria and requirements, while others preferred inclusion of a functional performance criterion for cognitive disabilities but offered no substantive proposals. Still other commenters—particularly those representing the IT community—thought more research was needed before meaningful requirements could be crafted. Given the variety of commenters' views and the inherent difficulty in creating a single functional performance criterion that adequately covers the wide spectrum of cognitive and intellectual disabilities, the Board elected not to reinstate this functional performance criterion.").

[133] Existing 255 Guidelines have functional criteria such that under "1193.41 (i) Operable with limited cognitive skills. Provide at least one mode that minimizes the cognitive, memory, language, and learning skills required of the user."). *See* i*d.* at V. Major Issues. C. Functional Performance Criteria; VII. Regulatory Process Matters. A. 4. Benefits of the Proposed Rule, Table 5 ("Time savings by people with hearing, cognitive, speech, and manual dexterity or motor impairments from improved federal websites.").

[134] *Id.* at IV. Rulemaking History, F. Harmonization with European Activities.

[135] *Available at*: http://www.etsi.org/deliver/etsi_en/301500_301599/301549/01.00.00_20/en_301549v010000c.pdf (last visited Feb. 24, 2015).

[136] *Id.* at IV. Rulemaking History, F. Harmonization with European Activities (Mandate 376 "required the three European standards organizations—European Committee for Standardization (CEN), European Committee for Electrotechnical Standardization (CENELEC) and European Telecommunications Standards Institute (ETSI)—to: inventory European and international accessibility requirements; provide an assessment of suitable testing and

public procurement of web and communications technology products to harmonize these products and services within Europe.[137]

Mandate 376 tracks functional performance criteria similar to that identified in the Access Board's proposed guidelines.[138] However, Mandate 376 includes functional criteria for web usage (and for ICT) by individuals with limited cognition: "Some users will need [web services] to provide features that enable them to make better use of their limited cognitive capabilities."[139] This clause addresses functional needs of persons with cognitive, language, and learning impairments. It includes specifications for adjustable timings, error indications and suggestions, and logical focus ordering as examples of design features that satisfy this requirement. Building on the European approach elaborating functional performance criteria for individuals with cognitive, language and learning disabilities, and for older adults,[140] comments

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conformity schemes; and, develop a European accessibility standard for ICT products and services along with guidance and support material for public procurements including an online toolkit.").

[137] *See* http://www.mandate376.eu/ (last visited Feb. 24, 2015). *See also* Loïc Martínez & Michael Pluke, Mandate M 376: New software accessibility requirements, *Procedia Computer Science*, 27, 271-80 (2014) (Mandate 376 functional performance clause for persons with physical, cognitive and sensory disabilities to access full functionality and documentation of web services and ICT, with and without use of assistive technology).

[138] *See, e.g.*, European Commission, Standard-EN 301 549, Accessibility requirements suitable for public procurement of ICT products and services in Europe, Accessible ICT Procurement Toolkit, Functional Performance Statements (2014) (for Usage without vision, with limited vision, without perception of colour, without hearing, with limited hearing, without vocal capability, with limited manipulation or strength, with limited reach, to Minimize photosensitive seizure triggers, with limited cognition); *available at*: http://mandate376.standards.eu/standard/functional-statements (last visited Apr. 23, 2015).

[139] *See* Draft EN 301 549 V1.0.0 (2013-02), European Standard, Accessibility requirements for public procurement of ICT products and services in Europe, at 17 (2013) (4.2.10: Usage with limited cognition); *available at*: http://www.etsi.org/deliver/etsi_en/301500_301599/301549/01.00.00_20/en_301549v010000c.pdf (last visited Feb. 24, 2015). *Id.* at 12.1.2 ("Accessible documentation: … providing alternate formats that meet the needs of some specific type of users (e.g. Braille documents for blind people *or easy-to-read information for persons with cognitive impairments*") (emphasis added). *Id.* at 13.1.5 ("Any speech to speech relay service shall enable speech *or cognitively impaired telephone users and any other user to communicate by providing assistance between them.*") (emphasis added). *See also* Anthony Giannoumis, Transatlantic Learning: From Washington to Brussels and beyond (*Inclusion*, this volume) (British Standards Institution ("BSI") standards on web accessibility (BS 8878:2010) recognize complex web navigation, content, and layout accessibility and usability for people with cognitive disabilities (*citing* BSI, Draft BS 8878:2009 Web accessibility–Building accessible experiences for disabled people–Code of practice: BSI.2009)).

[140] *See, e.g.*, Terms of Reference--Specialist Task Force STF ZV (TC HF) Recommendations to allow people with cognitive disabilities to exploit the potential of mobile technologies, ToR STT 488 (TC HF), ETSI (Jan, 28, 2015) (proposed action for research to support standards that enable older people and people with cognitive, language, and learning disabilities to use mobile devices with simplicity and predictability to access e-information

likely will be offered to the Access Board during the proposal notice period urging it to reconsider inclusion of functional performance criteria applicable to young and older individuals with cognitive disabilities, and to spur additional research in the area.

Closing

Vast numbers of individuals with disabilities with divergent interests increasingly are using the web. In the past, many of these individuals were among those least able to participate online and to exert pressure for web content equality. This is the reason why a new generation of disability advocates are vigorously defending their right to web.[141] Three recent legal cases illustrate the ongoing struggle for web equality across platforms, apps, and services offered such as in Massive Open Online Courses ("MOOCS"), IoT devices, and crowd-sourced apps (e.g., Uber-type transportation services).[142] In this environment, *web content is king*, and full and equal access to it is crucial in all aspects of daily life.

In the first case, in 2015, a group of U.S. disability advocates—individuals who are deaf and with hearing impairments, along with the National Association of the Deaf ("NAD")—sued Harvard University and the Massachusetts Institute of Technology ("MIT") under the ADA.[143]

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and services, such as e-learning, e-communicating, and e-interacting with public services, necessary for independent living and quality of life); *available at*: http://portal.etsi.org/STFs/STF_HomePages/STF488/STF488.asp (last visited Mar. 29, 2015); European Telecommunications Standards Institute (ETSI) (produces globally-applicable standards for ICT) and recognized by European Union as a European Standards Organization; *available at*: http://www.etsi.org/about (last visited Mar. 29, 2015).

[141] *See* Peter Blanck, Justice for All? Stories About Americans with Disabilities and Their Civil Rights, *J. Gender, Race & Justice*, 8(1), 1-32 (2004); Peter Blanck, Americans with Disabilities and their Civil Rights: Past, Present, Future, *U. Pittsburgh L. Rev.*, 66, 687-719 (2005); Peter Blanck, The First "A" in the ADA: And 25 More "A"s Towards Equality for Americans with Disabilities, *Inclusion*, -(-), -- - -- (forthcoming 2015).

[142] *See eQuality*, *supra* at 188-90 (discussion of MOOCs). *See also* National Federation of the Blind et al., v. Uber technologies, Inc., et al., Order Denying Motion to Dismiss (Case No. 14-cv-04086, NCDC ND CA 2015) (UberX is a transportation service that uses mobile software applications to arrange rides between passengers and Uber's fleet of drivers; plaintiffs allege UberX drivers violated ADA title III by denying access to blind individuals and their guide dogs; court denied Uber's motion to dismiss and found that Uber's potential liability as a public accommodation under ADA title III, and under California state law Unruh Act and Disabled Persons Act ("DPA"), required further factual development).

[143] Harvard and MIT are places of public accommodation under the ADA. *See* Peter Blanck et al., *Disability Civil Rights Law and Policy: Case and Materials*, at 26 (West Publishers, 3rd ed. 2014).

They alleged that these universities' online web-based content (for example, in MOOCs) was not captioned and often was unintelligibly captioned, making the information not accessible and incomprehensible.[144] These individuals stated: "[j]ust as buildings without ramps bar people who use wheelchairs, online content without captions excludes individuals who are deaf or hard of hearing."[145]

While the Harvard and MIT cases were awaiting determination, later in 2015, the U.S. Department of Justice ("DOJ") reached a settlement with edX, Inc. edX is a not-for-profit provider of MOOCS that was created by Harvard and MIT in 2012. It serves as an online platform for a consortium of approximately sixty other partnering universities providing hundreds of courses to over three million individuals worldwide.[146] The DOJ had alleged

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[144] *See* NAD, NAD Sues Harvard and MIT for Discrimination in Public Online Content (Feb. 12, 2015); *available at*: http://nad.org/news/2015/2/nad-sues-harvard-and-mit-discrimination-public-online-content (last visited Feb. 17, 2015). *See also* National Association of the Deaf et al., v. Harvard University, Class Action Complaint for Declaratory and Injunctive Relief (West. Div. D. Mass., Feb. 12, 2015); National Association of the Deaf et al., v. Massachusetts Institute of technology, Class Action Complaint for Declaratory and Injunctive Relief (West. Div. D. Mass., Feb. 12, 2015) (hereinafter "NAD Complaints").

[145] NAD Complaints, *supra* at 2. *See also* Casey Fabris, Technology: As High-Tech Teaching Catches On, Students With Disabilities Can Be Left Behind, *Chronicle of Higher Education* (Feb. 25, 2015) ("Peter Blanck, chairman of the Burton Blatt Institute at Syracuse University and author of *eQuality: The Struggle for Web Accessibility by Persons With Cognitive Disabilities* (Cambridge University Press, 2014), said blind and deaf students need to be considered when shifting core parts of teaching to the Internet. "So far, it's been kind of an incremental struggle by persons with disabilities to have full and equal access to the web," he said."); *available at*: http://m.chronicle.com/article/As-High-Tech-Teaching-Catches/190341/?key=SWN2cl9hMndFYXthYjZDZ2oAanJqYx0hMnNIPnwnbl5XFw== (last visited Feb. 26, 2015). *See also* Patrick Henry Wilson, *The next 50 years: A personal view, Biologically Inspired Cognitive Architectures*, 1, 92– 99, at 95 (2012). *See also* ADA Story Teller Project, Southwest ADA Center (2013); *available at*: http://www.southwestada.org/html/adastoryteller/about.html (last visited Jan. 15, 2015).

[146] *See* Justice Department Reaches Settlement with edX Inc., Provider of Massive Open Online Courses, to Make its Website, Online Platform and Mobile Applications Accessible Under the Americans with Disabilities Act, DOJ Website (Apr. 2, 2015) (edX courses offered largely for free in areas such as business, computer sciences, hard sciences, food and nutrition and social sciences); *available at*: http://www.justice.gov/opa/pr/justice-department-reaches-settlement-edx-inc-provider-massive-open-online-courses-make-its (last visited Apr. 2, 2015); Settlement Agreement between the United States of America and edX Inc., Under the Americans With Disabilities Act, DJ No. 202-36-255 (Apr. 2, 2015); *available at*: http://www.justice.gov/sites/default/files/opa/press-releases/attachments/2015/04/02/edx_settlement_agreement.pdf (last visited Apr. 2, 2015). *See also* Casey Fabris, edX to Improve Access to MOOCs for People With Disabilities, *Chronicle of Higher Education* (Apr. 3, 2015) ("Peter Blanck, … author of eQuality: The Struggle for Web Accessibility by Persons With Cognitive Disabilities … said edX was part of a new generation of services that are essentially content-management services rather than content providers. The settlement acknowledges that, he said. "It's reflective of a recognition of the responsibility of these new content-provider management systems to enable a platform that is accessible with content," … The

violations of ADA title III because edX's website and platform for providing MOOCs were not fully accessible to individuals who are blind or with low vision, who are deaf or hard of hearing, and who have physical disabilities affecting manual dexterity (e.g., from videos without captions, and information not usable and lacking compatibility with screen-reader software applications). The allegations did not include that edX's online platform and apps, and related activities and services, were not fully accessible to individuals with cognitive and learning impairments. Nonetheless, the remedies adopted likely will benefit individuals across the spectrum of physical, sensory, and cognitive disability (for example, compare the RtF Masterlist entries listed earlier).

The settlement agreement specifically requires edX to modify it website platform and mobile applications to conform with the WCAG 2.0 AA and to provide guidance and authoring tools to entities that create and post edX courses to ensure that the course content offered is accessible.[147] The four year agreement also requires edX to make its mobile applications and learning and content management systems fully accessible, to offer university course creators best practices for making online courses fully accessible, and to adopt web accessibility trainings and policies overseen by the company's Web Accessibility Coordinator.

The edX agreement does not necessarily resolve all the accessibility issues alleged in the Harvard and MIT litigation mentioned earlier. Universities and other online providers still must

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settlement also acknowledges "the responsibility of all parties to work together," he added, in that it holds edX and its member colleges accountable.").

[147] edX Settlement Agreement, *supra* at 8 ("incorporate accessibility in www.edx.org, its mobile applications, and its Platform to meet a wide variety of requirements of Participants with disabilities to enable Content Providers to develop accessible course content"). *See id.* Definitions (" "Content Management System" or "CMS" means the components of the edX software platform with which Course Creators interact, including, without limitation, the HTML editor, video upload screens, assessment authoring, and studio.edx.org, and excluding, for purposes of clarity, Course Content. EdX calls its CMS "Studio." "Content Provider" means any non-edX organization or institution that creates and/or provides content on www.edx.org, the Platform, or edX's mobile applications. "Course Content" means any information published to www.edx.org, edX's mobile applications, or the Platform by a Content Provider, including, but not limited to, courses or specific plug-ins or tools related to any course. ").

provide their information and course materials to edX and to other content management service providers in formats that are capable of accessible digital transmission. However, the edX agreement puts universities and other online information providers on notice that they must offer information in accessible formats when using the tools and means made available by edX and other like entities.[148]

In yet a third landmark legal development in 2015, the National Federation of the Blind ("NFB") and its members brought suit against Scribd, Inc., which is a California-based digital library that operates reading subscription services on its website and on applications for mobile phones and tablets.[149] The Plaintiffs contended that Scribd's website and apps were not accessible to individuals with visual impairments and who are blind in violation of the ADA because the company uses "an exclusively visual interface" and lacks non-visual means of operation, such as use with screen reader software to convert graphical information into audio and Braille formats.

In a decision of first impression for its jurisdiction,[150] the Vermont federal district court concluded that a defendant such as Scribd, which offers commercial services solely via the web,

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[148] *See also* Casey Fabris, edX to Improve Access to MOOCs for People with Disabilities, *supra* (Eve Hill, DOJ Deputy Assistant Attorney General for Civil Rights noted that the edX agreement "is different because it concerns both platform technology, created by edX, and the content itself, which is largely created by the consortium's member colleges.").

[149] National Federation of the Blind et al., v. Scribd, WL 1263336 (D.Ct. D. Vermont, Mar. 19, 2015) ("Scribd's customers pay a monthly fee to gain access to its collection of over forty million titles, including e-books, academic papers, legal filings, and other user-uploaded digital documents. Scribd's digital software program is accessed over the Internet.").

[150] The jurisdiction of United States Court of Appeals for the Second Circuit. Although the U.S. Court of Appeals for the First Circuit takes a similar approach, other Circuits require a "nexus" between the physical and digital worlds for the ADA to apply. *See eQuality*, *supra* at 81 & *passim* (discussion of "place" nexus requirement). *See also* Cullen, et al. v. Netflix, No. 13-15092: D.C. No. 5:11-cv-01199-EJD (9th Cir. Apr. 1, 2015) ("We have previously interpreted the statutory term "place of public accommodation" to require "some connection between the good or service complained of and an actual physical place." *See Weyer v. Twentieth Century Fox Film Corp.*, 198 F.3d 1104, 1114 (9th Cir. 2000). Because Netflix's services are not connected to any "actual, physical place[]," Netflix is not subject to the ADA."); Earll v. eBay, No. 13-15134: D.C. No. 5:11-cv-00262-EJD (9th Cir. Apr. 1, 2015) (same). In a separate action in the First Circuit, Netflix was deemed a place of accommodation for purposes of ADA title III. *See eQuality*, *supra* at 171 & *passim*.

provides services to the public within the purview of the ADA. Thus, Scribd may not discriminate against individuals with disabilities in their full and equal opportunity to enjoy the website and the apps offered to the public. The court wrote that "the site of the sale is irrelevant. All that matters is whether the good or service is offered to the public."[151] It reasoned:

> Now that the Internet plays such a critical role in the personal and professional lives of Americans, excluding disabled persons from access to covered entities that use it as their principal means of reaching the public would defeat the purpose of this important civil rights legislation.[152]

The recent legal developments that I have highlighted are part of a progressive effort to eliminate disability discrimination in education, employment, health care, housing, and access to the built and digital environments.[153] Change is being achieved incrementally through advocacy, where discrimination is challenged and brought to the fore. The ADA and the CRPD serve as principled bases in law to end segregation on the basis of disability.[154]

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[151] NFB v. Scribd, *supra* at 10 ("It would be "absurd" to conclude people who enter an office to purchase a service are protected by the ADA but people who purchase the same service over the telephone or by mail are not."). *Id*. at 12 ("Otherwise, a company could freely refuse to sell its goods or services to a disabled person as long as it did so online rather than within the confines of a physical office or store."). *Id.* at 16 ("it would make little sense if a customer who bought insurance from someone selling policies door to door was not covered but someone buying the same policy in the parent company's office was covered."). *Compare* Eric Goldman, Scribd Must Comply with the Americans with Disabilities Act, *Forbes* (Mar. 26, 2015) ("ADA doesn't expressly apply to Internet retailers, and stretching the statutory language to include online-only activities requires awkward interpretive contortions. … As a result [of the *Scribd* decision], many thousands of websites may have to incur substantial remediation expenses to comply with the ADA. In the interim, this opinion could produce a litigation tsunami against sites that aren't in compliance."); *available at:* http://www.forbes.com/sites/ericgoldman/2015/03/26/scribd-must-comply-with-the-americans-with-disabilities-act/ (last visited March 28, 2015). Many disability advocates await the coming "litigation tsunami."

[152] NFB v. Scribd, *supra* at 23-24.

[153] *See generally* Robert Silverstein, The Emerging Disability Policy Framework: A Guide for Developing Public Policy for Persons with Disabilities, *Iowa L. Rev.*, 85 1691 (2000).

[154] In 2015, the European Disability Forum called for "An inclusive digital continent" for its eighty million citizens with disabilities, with passage of a legal framework that offers a right to digital inclusion. *See* European Disability Forum, 80 Million Persons with Disabilities Call for Accessible Information & Communication Technologies (Feb. 21, 2015); *available at*: http://www.edf-feph.org/Page_Generale.asp?DocID=13855&thebloc=34202 (last visited Feb. 21, 2015).

It would be unfair, however, to suggest that disability advocates are alone in pursuit of web equality. Many technology, educational, and business leaders support this endeavor.[155] Nonetheless, the community of individuals with cognitive and other disabilities, and their families, have experienced, and continue to experience, discrimination.[156] Inaccessible and unusable online content is one aspect of that negative experience because it sends the message to "keep off the web." Inclusion and active participation have always been the remedy to segregation and discrimination, and they are the principles set forth in disability right laws for equal opportunity, independent living, and economic self-sufficiency.[157]

The ADA has yet to be applied in a principled manner to achieve web content equality for people with cognitive disabilities.[158] However, this chapter has argued that full and equal access to the web for all individuals increasingly is recognized. In 2015, U.S. Supreme Court Justice Anthony Kennedy wrote: "The Internet has caused far-reaching systemic and structural changes in the economy, and, indeed, in many other societal dimensions."[159]

In the coming years, it may be that in the U.S. amending the ADA, revising its implementing regulations, and seizing the opportunity to modify the Access Board's Section 508 refresh, are among actions required to ensure that web content equality is a right available to all persons with disabilities, including those with cognitive conditions.[160] Nonetheless, the

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[155] *See* James Sullivan, Clayton Lewis, & Jeffery Hoehl, Implications of Cloud Computing for People with Cognitive Disabilities, in C. Stephanidis (Ed.), *Universal Access in HCI, Part II*, 372–381 (2011).

[156] *See, e.g.,* Harold Pollack, Do Liberals Disdain the Disabled?, *NY Times* (Feb. 27, 2012); *available at*: http://www.nytimes.com/2012/02/27/opinion/do-liberals-disdain-the-disabled.html?_r=2 (last visited Jan. 15, 2015).

[157] *See, e.g.,* Michael Morris, Christopher Rodriguez, & Peter Blanck, P., ABLE Accounts: A Down Payment on Freedom, *Inclusion*, -(-), -- -- -- (forthcoming 2015).

[158] *See, e.g.,* Eve Hill, Legal and Policy Implications of Cloud Computing, *Lecture Notes in Computer Science*, 6765, 478, 481 (2011). Encouragingly, *see* Coleman Institute for Cognitive Disabilities, Declaration of the Rights of People with Cognitive Disabilities to Technology and Information Access, Thirteenth Annual Coleman Institute National Conference on Cognitive Disability and Technology, Broomfield, Colorado (Oct. 2, 2013).

[159] Direct Marketing Association v. Brohl, Executive Director, Colorado Department of Revenue, 135 S.Ct. 1124, at 1135 (U.S. 2015) (Kennedy, J., concurring decision).

[160] *See generally* Steven E. Stock, Daniel K. Davies Michael L. Wehmeyer, & Yves Lachapelle, Emerging new practices in technology to support independent community access for people with intellectual and cognitive

possibility for *eQuality*–the full and equal enjoyment of the web—for persons with cognitive and other disabilities in the U.S. and globally is on the horizon.

disabilities, *NeuroRehabilitation*, 1;28(3): 261-9 (Jan. 2011). *See also* Catherine Easton, The Web Content Accessibility Guidelines 2.0: An Analysis of Industry Self-regulation, *International J. L. & Information Technology*, 19(1), 74-93, at 89-92 (2010); Elizabeth Ellcessor, <ALT="Textbooks">: Web Accessibility Myths as Negotiated Industrial Lore, *Critical Studies in Media Communication*, 1-16 (2014) (debunking "web accessibility myths" such as that accessibility compromises good web design, cost-effectiveness, and aesthetics).