

Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

White Paper

**Individuals with Cognitive Disabilities:
Barriers to and Solutions for
Accessible Information and
Communication Technologies**

**Consumer and Governmental Affairs Bureau
Federal Communications Commission**

October 6, 2016

Table of Contents

I.	Introduction.....	1
II.	Cognitive Disability	3
A.	Definition of Cognitive Disability	3
B.	Demographics	4
III.	Benefits of ICT Access to People with Cognitive Disabilities	5
A.	Independent Living	5
B.	Education	6
C.	Employment.....	7
D.	Transportation.....	8
E.	Social Inclusion.....	8
IV.	Underutilization of Information and Communication Technologies	10
V.	U.S. Communications Accessibility Policy	11
A.	Communications Products and Services	12
1.	Telecommunications	12
2.	Advanced Communications	13
3.	Product Design and Recordkeeping Obligations	15
4.	Requesting Assistance from the FCC	16
B.	Telecommunications Relay Services	16
C.	Other Federal Accessibility Policy	18
D.	Policy Statements.....	19
1.	The Convention on the Rights of Persons with Disabilities	19
2.	FCC Public Notice on Access to Televised Emergency Information	20
3.	Coleman Institute Declaration: The Rights of People with Cognitive Disabilities to Technology and Information Access	20
4.	PCPID: Leveling the Playing Field: Improving Technology Access and Design for People with Intellectual Disabilities	21
5.	Chairman’s Awards for Advancement in Accessibility.....	21
VI.	Accessibility Solutions for an Inclusive ICT Ecosystem.....	22
A.	Obtaining Consumer Input.....	22
B.	Providing Access to Off-the-Shelf Equipment	25
C.	Accessibility Solutions in Response to Functional Limitations.....	26
1.	Functional Need: Memory	26

2.	Functional Need: Organizational Skills	28
3.	Functional Need: Information Processing.....	29
4.	Functional Need: Problem-Solving and Decision Making	30
5.	Functional Need: Attention.....	31
6.	Functional Need: Understanding Text	32
7.	Functional Need: Orientation.....	32
VII.	Looking Ahead: Taking the Steps Needed for Full Integration.....	33
Attachment:	Best Practices to Promote Effective Access to and Usability of ICT Products and Services for Americans with Cognitive Disabilities	

Individuals with Cognitive Disabilities: Barriers to and Solutions for Accessible Information and Communication Technologies

I. Introduction

In 2013, FCC Chairman Tom Wheeler wrote that “it is possible to observe how each broad epoch of the human saga has been defined by the way its inhabitants connect and communicate. From the economic patterns of production and consumption to the social patterns of everyday life, how we connect has defined who we are.”¹ Anecdotal and objective evidence abound to support the Chairman’s observations. The Internet has become a primary resource for finding meaningful employment, reliable healthcare, and quality education, and interacting with one’s peers.² Nearly two-thirds of Americans are smartphone owners and cite their devices as a primary entry point to all that the online world offers.³

Yet for the almost 30 million Americans with cognitive disabilities, access to communication technologies has too often been, or has been perceived to be, out of reach. According to the Coleman Institute for Cognitive Disabilities, “[t]he vast majority of people with cognitive disabilities have limited or no access to comprehensible information and usable communication technologies [ICT].”⁴ At a time when technology has become so integral to

¹ Tom Wheeler, *Net Effects: The Past, Present, and Future Impacts of Our Networks* 1 (2013), https://transition.fcc.gov/net-effects-2013/NET_EFFECTS_The-Past-Present-and-Future-Impact-of-Our-Networks.pdf.

² See Aaron Smith, *Searching for Work in the Digital Era* at 2 (2015), http://www.pewinternet.org/files/2015/11/PI_2015-11-19-Internet-and-Job-Seeking_FINAL.pdf (finding the Internet as a top resource for many of today’s job hunters); Pew Research Ctr., *The Diagnosis Difference* (2013) http://www.pewinternet.org/files/old-media/Files/Reports/2013/PewResearch_DiagnosisDifference.pdf; Linda Darling-Hammond et al., *Using Technology to Support At-Risk Students’ Learning* at 2-3, fig. 2 (2014), <https://edpolicy.stanford.edu/sites/default/files/scope-pub-using-technology-report.pdf>; Kristen Purcell et al., *How Teachers Are Using Technology at Home and in Their Classrooms* at 2 (2013), http://www.pewinternet.org/files/old-media/Files/Reports/2013/PIP_TeachersandTechnologywithmethodology_PDF.pdf.

³ See Pew Research Ctr., *U.S. Smartphone Use in 2015* at 3-4 (2015), http://www.pewinternet.org/files/2015/03/PI_Smartphones_0401151.pdf; Monica Anderson, *6 Facts about Americans and their Smartphones* (Apr. 1, 2015), <http://www.pewresearch.org/fact-tank/2015/04/01/6-facts-about-americans-and-their-smartphones/>.

⁴ See Coleman Institute for Cognitive Disabilities, Univ. of Colorado (Coleman Institute), *The Rights of People with Cognitive Disabilities to Technology and Information Access*, <http://www.colemaninstitute.org/declaration-text> (last visited Sept. 1, 2016) (Coleman Institute Declaration). The text of the Coleman Institute Declaration, developed by a consortium of consumers, national organizations and experts in cognitive disability through the Coleman Institute, accompanies the best practices attachment to this white paper. See *infra* note 7.

engaging with the world, it is critical that people with cognitive disabilities be afforded the same opportunities to realize the transformative power of digital communications. For individuals seeking to further their independence, self-determination and productivity, the benefits of information and communication technology cannot be overstated.⁵ Access to current and evolving information and communication technologies can allow these individuals to achieve integration into society as never before.⁶

This White Paper discusses the need for access to information and communications technologies by people with cognitive disabilities, and what that access entails. It first defines the various categories of “cognitive disability” and discusses the prevalence of this disability in America. It next highlights the importance of ICT, and the particular benefits that these technologies can afford individuals with cognitive disabilities. The part that follows identifies the following three reasons that people with cognitive disabilities have not adopted ICT at the same rate as Americans without disabilities: (1) the failure of many technologies to be accessible to people with cognitive disabilities; (2) the lack of effective outreach to people with cognitive disabilities about the availability of accessible features and practical uses of those features, which has led to misconceptions about ICT’s relevance to this population; and (3) the tendency of people with cognitive disabilities to have lower incomes and therefore be less able to afford certain technology. With this White Paper, the FCC’s Consumer and Governmental Affairs Bureau recommends several solutions and adaptive tools to address each of these barriers to access and adoption. The paper concludes by clarifying the legal bases underlying the rights to ICT access by people with cognitive disabilities.

Best Practices. This paper is accompanied by “Best Practices to Promote Effective Access to and Usability of ICT Products and Services for Americans with Cognitive Disabilities,”⁷ a set of recommendations designed “to promote effective access to and usability of ICT products and services for Americans with cognitive disabilities.”⁸ These practices are the culmination of extensive efforts by industry and consumer stakeholders to “increase awareness among ICT stakeholders, including manufacturers, service providers, and application developers.”⁹ These efforts began with a summit held by the FCC on October 28, 2015, the purpose of which was to gain a better understanding of the communication needs of people with cognitive disabilities, along with the accessibility solutions that can respond to those needs. On September 22, 2016, the DAC Best Practices were approved by the FCC’s Disability Advisory

⁵ See generally Karrie Shogren, Self-Determination and Self-Advocacy, in *Critical Issues in Intellectual and Developmental Disabilities: Contemporary Research, Practice, and Policy* 1-18 (2016).

⁶ See Anya Evmenova et al., *Assistive Technology Provides Supports for Individuals with Intellectual and Developmental Disabilities* (2012), <http://www.tamcec.org/wp-content/uploads/2013/05/AT-Supports-IDD.pdf>.

⁷ Herein we refer to this document as the DAC Best Practices. The Commission’s Disability Advisory Committee (DAC) was established on December 2, 2014, to provide advice and recommendations to the Commission on a wide array of disability issues within the FCC’s jurisdiction. The DAC currently has 37 full members. For a list of these members, see <https://www.fcc.gov/general/disability-advisory-committee>.

⁸ The DAC Best Practices are provided in the Attachment to this white paper.

⁹ DAC Best Practices at 1.

Committee (DAC), a committee established on December 2, 2014, to provide advice and recommendations to the Commission on a wide array of disability issues within the FCC’s jurisdiction. Recommendations contained in the DAC Best Practices are discussed throughout this White Paper.¹⁰

II. Cognitive Disability

A. Definition of Cognitive Disability

When a person is said to have a “cognitive disability,” it is generally understood that the individual has limitations or challenges in performing one or more types of cerebral tasks. For instance, individuals with a cognitive disability may experience difficulty in understanding or processing information, solving problems, or responding to stimuli.¹¹

It also is generally recognized that individuals who fall into the category of having a cognitive disability include those with intellectual disabilities,¹² pervasive developmental disabilities,¹³ acquired brain injuries,¹⁴ neurodegenerative disease,¹⁵ and learning disabilities.¹⁶

¹⁰ For more information about how to sign on to these practices, visit www.fcc.gov/disability, or contact DAC@fcc.gov.

¹¹ See generally Center for Persons with Disabilities, Utah State Univ., *WebAIM - Web Accessibility in Mind*, <http://webaim.org/articles/cognitive/> (last visited Sept. 1, 2016) (suggesting that cognitive disability be defined as having “greater difficulty with one or more types of mental tasks than the average person”).

¹² Intellectual disability is characterized by significant limitations in both **intellectual functioning** and in **adaptive behavior**, which originate **before the age of 18**. American Association on Intellectual & Developmental Disabilities, *Definition of Intellectual Disability*, http://aaidd.org/intellectual-disability/definition#.V8g4_zU-KVM (last visited Sept. 1, 2016).

¹³ Pervasive developmental disabilities are characterized by delays in the development of socialization and communication skills, and includes disabilities on the autism spectrum. National Institutes of Health, National Institute of Neurological Disorders & Stroke, *NINDS Pervasive Developmental Disorders Information Page*, <http://www.ninds.nih.gov/disorders/pdd/pdd.htm> (last visited Sept. 1, 2016).

¹⁴ Acquired brain injuries include all types of traumatic brain injuries caused by external forces, and also brain injuries caused after birth by cerebral vascular accidents (commonly known as stroke), and loss of oxygen to the brain (hypoxic brain injury). Brain Injury Association of America, *Frequently Asked Questions: What is the Difference between an Acquired Brain Injury and a Traumatic Brain Injury?*, <http://www.biausa.org/FAQRetrieve.aspx?ID=43913> (last visited Sept. 1, 2016).

¹⁵ Neurodegenerative disease includes Alzheimer’s disease, amyotrophic lateral sclerosis (ALS), Huntington’s disease, and Parkinson’s disease. National Institutes of Health, U.S. National Library of Medicine, *Degenerative Nerve Diseases, Also Called: Neurodegenerative Diseases*, <https://www.nlm.nih.gov/medlineplus/degenerativenervediseases.html> (last visited Sept. 1, 2016).

¹⁶ Learning disabilities are neurological conditions that interfere with an individual’s ability to store, process, or produce information. Learning Disabilities Association of America, *New to LD*, <http://ldaamerica.org/support/new-to-ld/> (last visited Sept. 1, 2016). The Coleman Institute confirms that “autism spectrum disorders, severe, persistent mental illness, brain injury, stroke, and Alzheimer’s disease and other dementias” should be included in the “broad range of cognitive conditions that can impact quality of life and independent living.” Coleman Institute, *A Few FAQs about the Declaration, The*

Functional challenges that can accompany these various types of disabilities include difficulties with memory, comprehension, problem solving, reading, language, attentiveness, and processing.¹⁷

Because having a “cognitive disability” can result in so many different types of functional disabilities, there can be no one-size-fits-all solution to ensuring communications access for all individuals who may fall within this population.¹⁸ While clinical diagnoses, such as autism, Down syndrome, dementia, or dyslexia, may be helpful in a medical setting, rigid adherence to these labels may inhibit best efforts to find meaningful ways to improve access to ICT for this community. It is for this reason that this paper focuses on the functional limitations that individuals with cognitive disabilities may experience – along with the solutions that can address each of these limitations, rather than particular clinical diagnoses that might cut across one or more functional limitations.¹⁹ For example, this paper focuses on ways that accessible ICT can be used to compensate for memory shortcomings, enable users to focus on certain tasks, address problems with organizational skills, and help travelers with orientation in their surroundings.

B. Demographics

Given their diversity, assessing the number of individuals living in the United States with cognitive disabilities is not an easy task. However, according to the Coleman Institute, approximately 30 million Americans, or more than 9% of the total U.S. population, had a cognitive disability in 2015.²⁰ In addition, 2013 U.S. Census Bureau statistics found that 4.4% of adults living in the United States of working age – i.e., adults ages 18-64 – had a cognitive

Rights of People with Cognitive Disabilities to Technology and Information Access, <http://www.colemaninstitute.org/declaration-faq> (last visited Sept. 1, 2016).

¹⁷ See Center for Persons with Disabilities, Utah State Univ., *supra* note 11.

¹⁸ See Edmund F. LoPresti et al., *Assistive Technology for Cognition: Understanding the Needs of Persons with Disabilities*, 27(2) IEEE Engineering in Medicine and Biology Magazine 39 (March/April 2008), <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=4469638> (last visited Sept. 1, 2016).

¹⁹ The World Health Organization (WHO) has created a disability assessment that includes a section on functional questions that can help to determine the functional limitations that most frequently indicate a cognitive disability. See T.B. Üstün et al., eds., *Measuring Health and Disability: Manual for WHO Disability Assessment Schedule WHODAS 2.0* (2010), http://apps.who.int/iris/bitstream/10665/43974/1/9789241547598_eng.pdf?ua=1&ua=1. For diagnosing a cognitive disability, WHO suggests questions about the degree of difficulty experienced in the following activities: concentrating on doing something for ten minutes; remembering to do important things; analyzing and finding solutions to problems in day-to-day life; learning a new task, for example, learning how to get to a new place; generally understanding what people say; and starting and maintaining a conversation. *Id.* at 48-49.

²⁰ Coleman Institute, *About Us*, <http://colemaninstitute.org/about-the-institute> (last visited Sept. 15, 2016); see also David L. Braddock et al., *The State of the States in Intellectual and Developmental Disabilities: Emerging from the Great Recession* 74 (10th ed. 2015) (estimating the population of Americans with cognitive disabilities at 29.9 million).

disability.²¹ These numbers are expected to increase rapidly as the nation's population ages.²² For example, it is reported that while an estimated 5.4 million Americans of all ages currently have Alzheimer's disease, by 2050, the number of Americans with this disease who are age 65 and older "may nearly triple, from 5.2 million to a projected 13.8 million."²³

III. Benefits of ICT Access to People with Cognitive Disabilities

Decades ago, the ability to communicate over long distances was a costly and burdensome luxury. As time and technology have progressed, and the Internet has become a driving force in the world economy, access to communications has shifted from being an indulgence to a necessity.²⁴ Ninety-six percent of working Americans now use information and communication technologies on a daily basis.²⁵ Smartphones, tablets, web applications, and other wireless and digital technologies have become essential to virtually every aspect of our lives.

A. Independent Living

In 1999, the U.S. Supreme Court ruled that the Americans with Disabilities Act guarantees individuals with disabilities the right, where appropriate, to live in the community.²⁶ Fundamental to this guarantee is ensuring that people with cognitive disabilities have the opportunity to live in a setting that is as integrated as possible with the rest of society.²⁷ Since the Supreme Court's *Olmstead* decision, government agencies have sought to enforce this right by promoting independent living for people with cognitive disabilities.

Markers of independent living can include the ability to live either by oneself or in a group home,²⁸ make choices about one's health and welfare, obtain and retain work that aligns

²¹ Susan Stoddard, 2014 Disability Statistics Annual Report at 11 (2014), <http://www.disabilitycompendium.org/docs/default-source/2014-compendium/annual-report.pdf>. This information is based on the U.S. Census Bureau's 2013 Income and Program Participation and American Community Surveys. *Id.* at 3-4.

²² See, e.g., LoPresti, *supra* note 18, at 30.

²³ Alzheimer's Association, *Prevalence*, <http://www.alz.org/facts/overview.asp> (last visited Sept. 15, 2016).

²⁴ Christopher Smith, *The Role of Communication Technology in Today's Society* (June 28, 2012), <https://www.govloop.com/community/blog/the-role-of-communication-technology-in-todays-society/> (noting that "[t]he natural human urge to connect with others is now a constant option, instead of an occasional luxury").

²⁵ U.S. Department of Commerce, *Fact Sheet: Digital Literacy* (May 13, 2011), <http://2010-2014.commerce.gov/news/fact-sheets/2011/05/13/fact-sheet-digital-literacy.html>.

²⁶ *Olmstead v. L.C. ex rel. Zimring*, 527 U.S. 581 (1999).

²⁷ See *Olmstead*, 527 U.S. at 597 ("Unjustified isolation, we hold, is properly regarded as discrimination based on disability.").

²⁸ See, e.g., Vicki A. Freedman & Brenda C. Spillman, *The Residential Continuum from Home to Nursing Home: Size, Characteristics and Unmet Needs of Older Adults*, 69 J. Gerontol. B. Psychol. Sci. Soc. Sci. (Suppl 1) S42 (2014), <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4303069/> (noting the extent to

with one's education and interests, and socialize within one's community. Independent living can provide an individual who has a cognitive disability with greater self-determination, and an increased ability to become integrated into society, both of which can result in a richer and more fulfilling life.

Accessible ICT – including accessible off-the-shelf technologies and, where necessary, peripheral or assistive devices designed to meet the specific needs of individuals with more severe or multiple disabilities – can make independent living attainable for many people with cognitive disabilities. For example, as discussed in more detail below, accessible ICT can assist a person by providing daily reminders, navigation assistance, and a constant means of staying in touch with support networks.²⁹

B. Education

Information technologies have become integral to the education of children with cognitive disabilities in the United States.³⁰ The reputation that ICT can provide, and their ability to engage students for longer periods of time, have convinced educators that ICT can be a critical tool of learning, especially for children with disabilities.³¹ Because many of the ICT devices now used in the classroom are off-the-shelf technology, they create no stigma, and the students embrace them.³² They are fun and can be intuitive to use. Moreover, mainstream devices, such as tablets, seem to be successful in improving not only students' knowledge and performance skills, but also "their motivation, communication skills and the strength of their social bonds."³³

which living is "independent" runs along a continuum – e.g., from group homes to private habitations – that is determined by the capabilities and limitations of the individual in question).

²⁹ ICT can enable independent living both through its use by people with disabilities and through its use by caregivers. For example, Virginia Ingram, the sole caregiver for her aunt who has Alzheimer's, leverages a number of ICT functions in order to help her manage her aunt's life remotely, and says, "[c]aring for the elderly is hard. Prioritizing yourself while serving as the caregiver for someone else is even harder. Technology can help both of you." Virginia Ingram, *Alzheimer's, Technology and Me* (Mar. 20, 2013), <http://www.virginiaingram.com/thoughts/2013/3/20/helping-aunt-ginny-alzheimers-technology-and-me>; see also JUICE Pharma Worldwide, *TRENDSPOOT: SXSW "Helping Aunt Ginny: Alzheimer's, Technology & Me"* (May 30, 2013), <https://www.youtube.com/watch?v=ZbyPIGnv93I>.

³⁰ Suren Ramasubbu, *Breaking Down Barriers for Special Needs Children* (Apr. 20, 2016), http://www.huffingtonpost.com/suren-ramasubbu/breaking-down-barriers-fo_b_9733140.html (stating that "[n]o other field of education benefits as much from progress in technology as special education").

³¹ Gerry Kennedy, *Using iPads with Students with Intellectual Disabilities* (May 15, 2012), <http://www.spectronics.com.au/blog/tools-and-resources/using-ipads-with-students-with-intellectual-disabilities/>.

³² Deborah Newton & Amy Dell, *Mobile Devices and Students with Disabilities: What Do Best Practices Tell Us?*, 26 J. Spec. Educ. Technol. 47, 47 (2011) (noting that one "historical barrier to AT [assistive technology] implementation that mobile devices bypass is students refusing to use or abandoning AT because of their desire not to look 'different' from their typical peers" and that "[m]any students have stated emphatically that they feel conspicuous using AT, that they do not want to be singled out, and therefore, that they will not use any 'special' technology").

³³ Anya Kamenetz, *iPads In Special Ed: What Does The Research Say?* (June 13, 2014), <http://www.npr.org/sections/ed/2014/06/13/321058641/ipads-in-special-ed-what-does-the-research-say>

Finally, compared to other assistive technologies, mainstream ICT devices are affordable for school districts to purchase, and flexible enough to be used by students with a variety of disabilities and needs.³⁴

C. Employment

Nowhere is the importance of accessible ICT more evident than in the pursuit and retention of employment. Employment provides individuals with a source of income, as well as a sense of purpose, pride, and belonging. Accessible information and communication technology can significantly increase the employability and incomes of many people with cognitive disabilities, in addition to providing overall enhancements to the quality of their jobs and their job satisfaction. The ability to access and utilize ICT successfully is a prerequisite for many of even the most basic employment opportunities.³⁵ In addition, ICT is essential to many of the job training opportunities that provide the groundwork for securing and retaining employment.³⁶

Finally, ICT can facilitate job coaching, enhance orientation, and provide other supports that can be critical for keeping a person with cognitive disabilities employed.³⁷ For example, list and time alert functions on a smartphone or tablet can assist employees in fulfilling job responsibilities in a timely and complete manner, job coach functions can be performed remotely, through mobile technology, and task prompting features can provide instructional aids and task sequence support to identify next actions that the employee must perform, based on the environment in which the employee is located.³⁸ These and other accessibility solutions that can be useful in an employment setting are discussed below, in Part VI.C.

(reporting that, for students with cognitive disabilities using iPads, “[t]he changes showed up in everything from little things, like saying hello to each other, to big things, like dreaming of a future”).

³⁴ Gail Robinson, *Technology Offers Special Help in Special Ed* (June 5, 2014), <http://hechingerreport.org/technology-offers-special-help-special-ed/> (“Just a few years ago, [schools] would have used bulky communication devices costing \$6,000 to \$10,000, if they used any technology at all. Or, they would have communicated by picking out pictures and sticking them to a board.”).

³⁵ Ontario Literacy Coalition, *Menial No More: A Discussion Paper on Advancing Our Workforce Through Digital Skills at 4* (2011), http://www.essentialskillsontario.ca/sites/www.essentialskillsontario.ca/files/menial_no_more_0.pdf (noting that menial occupations such as delivery person, shelf stocker, and barista now all require some IT knowledge).

³⁶ See, e.g., Stephen Armstrong & Maruxa Ruiz Del Arbol, *Unconnected and Out of Work: the Vicious Cycle of Having No Internet* (Apr. 9, 2015), <https://www.theguardian.com/society/2015/apr/09/unconnected-and-out-of-work-the-vicious-circle-of-having-no-internet>.

³⁷ See *infra* Part VI.C.2, 7.

³⁸ See Tony Gentry et al., *Reducing the Need for Personal Supports among Workers with Autism Using an Ipod Touch as an Assistive Technology: Delayed Randomized Control Trial*, 45 *J. Autism & Dev. Disorder* 669, 680 (2015) (finding that the use of an iPod touch with mobile capabilities as an assistive technology significantly reduced the need for in-person job coaching support by workers with autism spectrum disorders, without reducing functional performance on the job); see also Michael Melonis et al.,

D. Transportation

Access to ICT is also critical to the ability to travel independently around one's community. People with cognitive disabilities need the ability to safely and reliably travel from their homes to their jobs, schools, recreational activities, healthcare facilities, and support personnel in order to obtain the services needed for daily living.

Optimizing ICT for use by people with cognitive disabilities can make traveling markedly easier for these individuals. For example, using mobile devices, those who cannot read maps or text can follow visual representations of landmarks along their designated routes to travel from point to point.³⁹ In addition, people with cognitive disabilities can sync their devices with municipal transit websites that can alert them to the location of a bus stop, advise them on what buses to take, and inform them when the next bus to their destination will arrive. With the use of global positioning, individuals also can receive assistance when navigating on foot, by receiving prompts and cues relevant to their location.⁴⁰ Similarly, devices can assist individuals in the event of an emergency – for example, severe weather – by enabling them to summon assistance if stranded.⁴¹

E. Social Inclusion

Social inclusion is basic to full participation in any community.⁴² Staying connected through voice, video and text communications, as well as through social media tools, such as Facebook, allows individuals to foster and maintain meaningful personal relationships with

Empowering Adults with a Cognitive Disability Through Inclusion of Non-Linear Context Aware Prompting Technology (2012), <https://cs.uwaterloo.ca/~mgrzes/documents/melonis12resna.pdf>.

³⁹ Linda Mechling, *Review of Twenty-First Century Portable Electronic Devices for Persons with Moderate Intellectual Disabilities and Autism Spectrum Disorders*, 46 *Education and Training in Autism and Developmental Disabilities* 479, 493 (2011).

⁴⁰ For example, Ben, a young adult from the metropolitan Washington DC area, successfully uses a travel training app provided by SpecialNeedsWare and the Arc of NOVA to navigate on public transportation, and states that the independence it gives him will help him in “having a good life and becoming a good adult in the future.” President’s Comm. for People with Intellectual Disabilities, *Leveling the Playing Field: Improving Technology Access and Design for People with Intellectual Disabilities* at 32 (2015) <http://www.acl.gov/programs/aid/Programs/PCPID/docs/PCPID-2015-Report-to-President.pdf> (PCPID Report) (citing SpecialNeedsWare and the Arc of NOVA, *TravelMate* (July 23, 2015) www.youtube.com/embed/nMVL4MuvN3Q).

⁴¹ See also *infra* Part VI.C.7 (discussing other ways that ICT can assist users with their orientation while traveling in their communities).

⁴² See generally Matthew Bogenschutz & Angela Amado, *Social Inclusion for People with IDD: What We Know and Where We Go from Here*, in *Critical Issues in Intellectual and Developmental Disabilities: Contemporary Research, Practice, and Policy* at 19-36 (2016); see also National Council on Disability, *The Power of Digital Inclusion: Technology's Impact on Employment and Opportunities for People with Disabilities* at 30-31 (2011), http://www.ncd.gov/rawmedia_repository/NCD110303_DigitalInclusion_Beta.pdf.

family, friends, and loved ones, whether they are next door or miles away.⁴³ As explained by one researcher, these communication tools permit people with cognitive disabilities to “keep up close relationships, [and] give and receive social support . . .”⁴⁴ The ability to maintain social contacts and obtain information through ICT is particularly critical for senior citizens or people with cognitive disabilities who have multiple disabilities, or for whom travel or in-person social engagement in the community may be difficult or challenging.

But social inclusion is not only defined by the ability to build and maintain social connections. The ability to be included – or accepted – can also be determined by the ability to use the same technology that everyone else is using. Compelling people with a cognitive disability, or any disability, to use specialized equipment can often lead to those individuals feeling like societal “others.” In contrast, the ability to use mainstream, off-the-shelf devices as everyone else does can lend people with disabilities a sense of dignity and belonging, and the rightful impression that they have much in common with those who do not have a disability. Because smartphones and other communications devices have become so ubiquitous and central to American life, ensuring their accessibility to people cognitive disabilities is necessary for the meaningful integration and full inclusion of this population.

Moreover, the potential for deemphasizing what separates people with cognitive disabilities from those without disabilities by making ICT more accessible works in two directions. It is not just the case that people with cognitive disabilities will be more inclined to use mainstream devices. The feature adjustments needed to make ICT devices more accessible to people with cognitive disabilities often will be appealing to mainstream consumers as well. For example, people both with and without cognitive disabilities can benefit from simplified user interfaces, customizable devices, and clearer language and instructions.⁴⁵ Indeed, many of the mobile device features and applications originally designed for people with disabilities are crossing over into mainstream use. Screen magnifiers, text-to-speech, and screen readers are routinely used by members of the mainstream public.⁴⁶ Like television closed captions, sidewalk curb cuts, and speech recognition software, ICT accommodation tools provided for people with cognitive disabilities could, in the end, be utilized by the general population just as much as by

⁴³ See Carmit-Noa Shpigelman & Carol J. Gill, *How Do Adults with Intellectual Disabilities Use Facebook?*, 29 *Disability & Soc’y* 1601 (2014), <http://www.tandfonline.com/doi/abs/10.1080/09687599.2014.966186> (finding that users with cognitive disabilities use Facebook as much as non-disabled users do to connect with family members and real-world friends).

⁴⁴ Shpigelman & Gill, *supra* note 43, at 1601.

⁴⁵ See IBM, *Understanding Accessibility*, http://www-03.ibm.com/able/access_ibm/disability.html (last visited Sept. 1, 2016).

⁴⁶ Tracy Gray et al., *Unleashing the Power of Innovation for Assistive Technology* at 7 (2010), http://ctdinstitute.org/system/files/NCTI_Unleashing%20the%20Power%20of%20Innovation%20for%20Assistive%20Technology%20FINAL.pdf (“Text-to-speech is an integral part of in-vehicle GPS units and cell phones; screen magnifiers help consumers cope with shrinking screen sizes; and captions on TV and Internet video are being used to reinforce language learning and to provide viewing solutions for noisy environments. Applications originally designed for people with disabilities are increasingly recognized as presenting solutions for the wider consumer market.”).

their originally intended users. As a result, the opportunity to make judgments about someone's abilities based on the technology they're using shrinks, while the opportunity to relate to another's daily lived experiences, regardless of disability, grows.

IV. Underutilization of Information and Communication Technologies

Despite the benefits that ICT can provide, people with disabilities are much less likely to acquire information and communications technologies.⁴⁷ Moreover, some people with cognitive disabilities who own ICT devices are less likely to use their devices, or are more likely to use them ineffectively. While various reasons are given for this, including “unrealistic expectations of the technology, poor confidence in using technology, lack of awareness of one's limitations, inappropriate needs assessment, poor device selection, and lack of support from caregivers,”⁴⁸ the primary reasons for such underutilization appear to fall into three categories.

Access Barriers. First, literature suggests that accessibility barriers make communication devices difficult for certain people with limited cognitive abilities to use.⁴⁹ Further, it is not unusual that once a person with a cognitive disability becomes familiar with how to use a particular technology, that person becomes hesitant to upgrade his or her device or service, even when a superior (and possibly more usable) technology becomes available. This is largely due to a reluctance to address the challenges involved with mastering a new device.⁵⁰ This can result in individuals using outdated technology, even when new products might better serve their needs.

Lack of Outreach. Second, the perceived complexity of many communications devices may deter their acquisition.⁵¹ Consumers and their caregivers may simply assume that a technology cannot be made accessible to them, even when a device has features to address the

⁴⁷ See, e.g., Gentry, *supra* note 38, at 671 (citing a 2012 study finding that people with disabilities use the Internet at rates that are half that of the general population); see also LoPresti, *supra* note 18, at 31 (reporting that almost 60% of individuals with disabilities had never used a computer, compared with less than 25% of persons without disabilities, and less than 10% of persons with disabilities had access to the Internet, compared with 38% of persons without disabilities); Jonathan Lazar, *Reducing Barriers to Online Access for People with Disabilities*, 27 *Issues in Science and Technology*, no. 2, Winter 2011, available at <http://issues.org/27-2/lazar/> (last visited Sept. 1, 2016) (“People with disabilities use the Internet and related technologies at levels well below those of the rest of the population”); Shpigelman & Gill, *supra* note 43, at 1604 (citing a 2011 survey indicating that “54% of disabled adults use the Internet compared with 81% of non-disabled adults”).

⁴⁸ LoPresti, *supra* note 18, at 31 (listing these various factors, and citing a study that found 15% of devices owned by elderly persons with cognitive disabilities were not used, mostly because they did not match the owners' needs).

⁴⁹ Mechling, *supra* note 39, at 487 (citing inaccessibility, in addition to cost and the general perception that such individuals do not need this technology, as primary reasons for failure to acquire cell phones for people with cognitive disabilities).

⁵⁰ See, e.g., Annicka Hedman et al., *How Older Adults with Mild Cognitive Impairment Relate to Technology as Part of Present and Future Everyday Life: A Qualitative Study* at 4 (2016), http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4815058/pdf/12877_2016_Article_245.pdf (“[T]he paradox of having to pass difficulty to achieve simplicity was recurrent.”).

⁵¹ LoPresti, *supra* note 18, at 31.

consumers' accessibility needs.⁵² These perceptions may result from both the lack of effective outreach to this community about accessibility options, and a lack of knowledge about the availability and functions of these options by retail personnel who sell these technologies.

Economic Barriers. Finally, the cost of communications equipment and services may present a significant deterrent to ICT adoption for people with cognitive disabilities. Historically, the rate of employment for people with disabilities has been significantly lower than that of the general public. By way of illustration, in 2013, only 22% of working-age Americans with disabilities were employed, compared to 65% percent of working-age people without disabilities.⁵³ As a consequence, working-age Americans with disabilities had a median income that was only two-thirds of the median income of working-age individuals without disabilities.⁵⁴ Additionally, in 2013, almost 30% of working-age Americans with disabilities were living in poverty, compared with a 13.6% poverty rate for the same population without disabilities.⁵⁵

Employment rates for people with cognitive disabilities have been reported to be even lower than those for people with other types of disabilities. For example, employment percentages for people with disabilities impacting self-care and independent living were only slightly over 15%, which is markedly lower than the employment percentage (22%) for people with disabilities as a whole.⁵⁶

The lower incomes that accompany such unemployment mean that people with cognitive disabilities have experienced economic challenges when confronted with the high costs of connectivity and communications equipment. In June 2016, the FCC took steps to alleviate this burden by modernizing its Lifeline program in order to reduce the cost of fixed and mobile broadband for low-income Americans,⁵⁷ and continues to undertake efforts to reach out to individuals with cognitive disabilities and their families to educate them about this Lifeline option.

V. U.S. Communications Accessibility Policy

There are various legal protections that help to ensure the rights of people with disabilities to accessible ICT. These protections, adopted over the past several decades, have

⁵² See generally Michael Wehmeyer et al., *Support Needs of Adults with Intellectual Disability across Domains: The Role of Technology*, 27 J. Spec. Educ. Tech. 11 (2012), . <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4192661/>.

⁵³ U.S. Census Bureau, *2013 American Community Survey, American FactFinder*, Table S1811, http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_14_5YR_S1811&prodType=table (last visited Aug. 31, 2016). Moreover, the employment rates for people with disabilities have fallen almost continuously since the 1990s, notwithstanding an increased number of federal and state prohibitions against employment discrimination. National Council on Disability, *supra* note 42, at 7.

⁵⁴ Stoddard, *supra* note 21, at 20.

⁵⁵ *Id.* at 22.

⁵⁶ *Id.* at 15.

⁵⁷ See *Lifeline and Link Up Reform and Modernization et al.*, Third Report and Order, Further Report and Order, and Order on Reconsideration, 31 FCC Rcd 3962 (2016).

been pivotal in creating the promise of a more accessible communications future for persons with disabilities, and hold particular promise for enhanced accessibility by people with cognitive disabilities.

A. Communications Products and Services

1. Telecommunications

Section 255 of the Communications Act of 1934 (the Act), as amended, requires manufacturers of telecommunications equipment and providers of telecommunications services to ensure that their equipment and services are accessible to and usable by individuals with disabilities, if readily achievable.⁵⁸ This mandate covers, among other things, telephone calls, call waiting, speed dialing, call forwarding, computer-provided directory assistance, call monitoring, caller identification, call tracing, and repeat dialing.⁵⁹ In addition, as implemented by the Commission, section 255 of the Act covers voice mail, interactive voice response systems (phone systems that provide callers with menus of choices),⁶⁰ and interconnected voice over Internet protocol (VoIP) equipment manufacturers and service providers.⁶¹

The Commission's rules requiring accessibility direct that the input, control, and mechanical functions must be locatable, identifiable, and operable in accordance with certain performance objectives.⁶² These objectives include, among other things, the ability to operate such features with limited cognitive skills by providing at least one mode that minimizes the cognitive, memory, language, and learning skills required of users.⁶³ In order to ensure that their products and services are "usable," manufacturers and providers that are subject to section 255 of the Act must ensure that people with disabilities have access to the full functionality and documentation for the product or service, including instructions, product or service information (including information about accessible features), and technical customer support that is

⁵⁸ 47 U.S.C. § 255(b), (c); *see also* 47 CFR Parts 6, 7. Section 255 was added to the Communications Act by the Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996).

⁵⁹ *See Implementation of Sections 255 and 251(a)(2) of the Communications Act of 1934, as Enacted by the Telecommunications Act of 1996: Access to Telecommunications Service, Telecommunications Equipment and Customer Premises Equipment by Persons with Disabilities*, Report and Order and Further Notice of Inquiry, 16 FCC Rcd 6417, 6449, para. 77 (1999).

⁶⁰ 47 CFR Part 7; *see also* FCC, *Telecommunications Access for People with Disabilities* (Nov. 5, 2015), <http://www.fcc.gov/guides/disabled-persons-telecommunications-access-section-255>.

⁶¹ *Implementation of Sections 255 and 251(a)(2) of the Communications Act of 1934, as Enacted by the Telecommunications Act of 1996: Access to Telecommunications Service, Telecommunications Equipment and Customer Premises Equipment by Persons with Disabilities; Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, Report and Order, 22 FCC Rcd 11275 (2007). An interconnected VoIP service requires a broadband connection from the user's location and IP-compatible equipment, enables real-time, two-way voice communications, and permits users generally to make calls to and receive calls from the public switched telephone network (PSTN). 47 CFR § 9.3.

⁶² *See* 47 CFR §§ 6.3(a)(1)(x), 7.3(a)(1)(x).

⁶³ *See* 47 CFR §§ 6.3(a)(1)(x), 7.3(a)(1)(x).

functionally equivalent to that provided to individuals without disabilities.⁶⁴ Further, this requires access to user guides, bills, installation guides for end-user devices, and product support communications.⁶⁵ There can be no additional charge to consumers who request end-user product documentation in alternate formats or alternate modes or those who receive accessible technical support from call centers and inside service centers.⁶⁶

Manufacturers and providers must satisfy the requirements called for by section 255 if “readily achievable.”⁶⁷ Accessibility is considered to be “readily achievable” when it is “easily accomplishable and able to be carried out without much difficulty or expense.”⁶⁸ When incorporating access features is not readily achievable, covered entities must ensure that their products and services are compatible with existing peripheral devices or specialized equipment commonly used by individuals with disabilities to achieve access, if readily achievable.⁶⁹

2. Advanced Communications

The Twenty-First Century Communications and Video Accessibility Act of 2010 (CVAA) amended the Communications Act to ensure that individuals with disabilities would be able to fully utilize advanced communications services and equipment in the ever-changing twenty-first century communications marketplace.⁷⁰ In enacting the CVAA, Congress concluded that people with disabilities often had not shared in the benefits of rapid technological advancement.⁷¹

Section 716 of the Act requires providers of advanced communications services and manufacturers of equipment used with those services to ensure that their services and products

⁶⁴ See 47 CFR §§ 6.3(l), 7.3(l).

⁶⁵ 47 CFR §§ 6.11(a), 7.11(a).

⁶⁶ 47 CFR §§ 6.11(a)(1)-(3), 7.11(a)(1)-(3).

⁶⁷ 47 U.S.C. § 255(b), (c).

⁶⁸ 47 CFR §§ 6.3(h), 7.3(h). Determining whether incorporating an accessibility feature into a product or service is readily achievable is based on a number of factors that weigh the nature and cost of accessibility required against the resources available to the covered entity. 47 CFR §§ 6.3(h)(1)-(4), 7.3(h)(1)-(4).

⁶⁹ 47 U.S.C. § 255(d). The term “specialized customer premises equipment” means customer premises equipment that is commonly used by individuals with disabilities to achieve access. 47 CFR §§ 6.3(i), 7.3(i). The term “customer premises equipment” means equipment employed on the premises of a person (other than a carrier) to originate, route, or terminate telecommunications. 47 U.S.C. § 153(16); 47 CFR §§ 6.3(c), 7.3(c). For purposes of telecommunications accessibility, customer premises equipment includes equipment that is specially designed to provide, and is needed for the effective use of, interconnected VoIP service. 47 CFR § 6.3(c).

⁷⁰ Pub. L. No. 111-260, 124 Stat. 2751 (2010) (as codified in various sections of 47 U.S.C.); *see also* Pub. L. No. 111-265, 124 Stat. 2795 (2010) (making technical corrections to the CVAA); S. Rep. No. 111-386 at 1 (2010) (Senate Report); H.R. Rep. No. 111-563 at 19 (2010) (House Report) (both noting that the communications marketplace had undergone a “fundamental transformation” since the enactment of section 255 in 1996).

⁷¹ Senate Report at 1-2; House Report at 19.

are accessible to and usable by individuals with disabilities, unless doing so is not achievable.⁷² Advanced communications services include interconnected and non-interconnected VoIP service, electronic messaging service, and interoperable video conferencing service.⁷³ In contrast to interconnected VoIP services, which enable people to make and receive calls to and from the public switched telephone network (PSTN), non-interconnected VoIP services include services that enable real-time voice communications either to or from the PSTN (but not both) or services that neither begin nor end on the PSTN at all.⁷⁴ Electronic messaging services include services such as e-mail, short message service (SMS) text messaging, and instant messaging, which enable real-time or near real-time text messages between individuals over communications networks.⁷⁵ Interoperable video conferencing services provide real-time video communications, including audio, to enable users to share information.⁷⁶ The requirements for achieving the accessibility and usability of advanced communications services and equipment under section 716 are virtually identical to the requirements for achieving the accessibility and usability of telecommunications services and equipment under section 255,⁷⁷ with the following few exceptions.

First, while there is an expectation that accessible features will be built into a telecommunications product or service to achieve compliance under section 255, the accessibility requirements for section 716 may be satisfied by: (1) building accessibility into the product or service;⁷⁸ or (2) using third-party applications, peripheral devices, software, hardware, or equipment that is available to consumers at nominal cost and that individuals with disabilities

⁷² 47 U.S.C. § 617(a)(1), (b)(1), (g); 47 CFR § 14.20(a)(1)-(2).

⁷³ 47 U.S.C. § 153(1); *see also* 47 CFR § 14.10(c). Section 716 of the Act does not apply to services or equipment, including interconnected VoIP services and equipment, that were subject to section 255 on October 7, 2010. 47 U.S.C. § 617(f). Such services and equipment remain subject to the requirements of section 255. *Id.*

⁷⁴ *See* 47 U.S.C. § 153(25), (36); 47 CFR § 9.3.

⁷⁵ 47 U.S.C. § 153(19).

⁷⁶ 47 U.S.C. § 153(27). The extent to which section 716 of the Act requires interoperable video conferencing services to be accessible is the subject of a pending Commission proceeding. *See Implementation of Sections 716 and 717 of the Communications Act of 1934, as Enacted by the Twenty-First Century Communications and Video Accessibility Act of 2010 et al.*, Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd 14557, 14684-87, paras. 301-05 (2011) (*ACS Report and Order*).

⁷⁷ For example, consistent with the Commission's rules for telecommunications services and equipment under section 255, the Commission's rules define accessibility under section 716 to require, among other things, that the input, control, and mechanical functions must be locatable, identifiable, and operable by persons with limited cognitive skills by providing at least one mode that minimizes the cognitive, memory, language, and learning skills required of users. 47 CFR § 14.21(b)(1)(x); *see also* 47 CFR §§ 14.20(d) (prescribing information, documentation, and training requirements for advanced communications service providers and equipment manufacturers); 14.21(c) (defining "usable" to mean that individuals with disabilities have access to the full functionality and documentation for the product).

⁷⁸ 47 U.S.C. § 617(a)(2)(A), (b)(2)(A).

can access.⁷⁹ When ensuring accessibility through either of these options is not achievable, covered entities must ensure that their products and services are compatible with existing peripheral devices or specialized equipment commonly used by individuals with disabilities to achieve access, unless this is not achievable.⁸⁰

Second, the standard for determining whether the obligations of section 255 apply is whether compliance would be readily achievable for the covered entity.⁸¹ By contrast, covered entities must comply with the obligations of section 716, unless doing so would not be “achievable,” which means “with reasonable effort or expense, as determined by the Commission.”⁸²

3. Product Design and Recordkeeping Obligations

Under both sections 255 and 716 of the Act, manufacturers and providers must evaluate the accessibility, usability, and compatibility of their covered products and services; incorporate such evaluation throughout their product design, development, and fabrication, as early and consistently as possible; and identify barriers to accessibility and usability as part of the product design and development processes.⁸³

Manufacturers and providers must also create and maintain records of the efforts they have taken to implement section 255 and section 716 of the Act with regard to their products and services.⁸⁴ Specifically, these records must include information about their efforts to consult with individuals with disabilities, descriptions of the accessibility features of their products and services, and information about the compatibility of their products and services with peripheral devices or specialized equipment commonly used by individuals with disabilities to achieve access.⁸⁵

⁷⁹ 47 U.S.C. § 617(a)(2)(B), (b)(2)(B).

⁸⁰ 47 U.S.C. § 617(c).

⁸¹ 47 U.S.C. § 255(b), (c); 47 CFR §§ 6.3(h), 7.3(h).

⁸² 47 U.S.C. § 617(a)(1), (b)(1), (g); 47 CFR §§ 14.10(b), 14.20(a)(1)-(2). The Commission considers the following factors when determining whether incorporating an accessibility feature into a product or service is achievable: (1) the nature and cost of the steps needed to meet the requirements of section 716 of the Act; (2) the technical and economic impact on the operation of the manufacturer or provider and on the operation of the specific equipment or service in question; (3) the type of operations of the manufacturer or provider; and (4) the extent to which the service provider or manufacturer in question offers accessible services or equipment containing varying degrees of functionality and features, and offered at differing price points. 47 CFR § 14.10(b)(1)-(4). The Commission weighs each factor equally and makes such determinations on a case-by-case basis. *ACS Report and Order*, 26 FCC Rcd at 14608 paras. 122-23.

⁸³ 47 CFR §§ 6.7(a), 7.7(a); *see also* 47 CFR § 14.20(b)(1) (requiring advanced communications service providers and equipment manufacturers to consider performance objectives at the design stage as early as possible and implement them to the extent they are achievable), (b)(2) (requiring advanced communications service providers and equipment manufactures to identify barriers to accessibility and usability as part of such evaluation).

⁸⁴ 47 CFR § 14.31(a).

⁸⁵ 47 CFR § 14.31(a)(1)-(3).

Section 255 of the Act also requires the inclusion of people with disabilities when market research, product design, testing, pilot demonstrations, and product trials are conducted, and directs manufacturers and service providers to make reasonable efforts to validate access solutions through testing with individuals with disabilities.⁸⁶ While the Commission has not imposed specific user testing requirements under section 716, it has expressed its support for such testing and has noted the benefits of this practice for “individuals with a wide range of disabilities.”⁸⁷

4. Requesting Assistance from the FCC

Individuals with disabilities who encounter accessibility barriers in communications products and services may contact a company directly to try to resolve the accessibility problem. Contact information for a company’s accessibility customer care representative is available on the FCC’s website at <http://apps.fcc.gov/recci-search/> or by contacting the FCC’s Disability Rights office. Alternatively, an individual may request assistance from the FCC’s Disability Rights Office to resolve the accessibility problem.⁸⁸ The Disability Rights Office will work with the individual and the company for at least 30 days to address the issue. There is no charge for this assistance. If the accessibility problem is not resolved in 30 days, the individual has two choices. He or she may: (1) request an additional 30 days of assistance from the Disability Rights Office to continue to try to resolve the accessibility problem;⁸⁹ or (2) file an informal complaint about the accessibility problem with the FCC’s Enforcement Bureau. More information about these options is available online at <https://consumercomplaints.fcc.gov/hc/en-us/articles/202939874-Take-Action-Options-for-Filing-an-Accessibility-Complaint> or by contacting the FCC’s Disability Rights Office by sending an e-mail to dro@fcc.gov, or by calling 202-418-2517 (voice), 202-418-2922 (TTY), or 844-432-2275 (videophone).

B. Telecommunications Relay Services

Some individuals with cognitive disabilities may also be eligible to use a telecommunications relay service (TRS),⁹⁰ which uses communications assistants to enable individuals who are deaf, hard of hearing, deaf-blind, or who have a speech disability to place

⁸⁶ 47 CFR §§ 6.7, 7.7.

⁸⁷ *ACS Report and Order*, 26 FCC Rcd at 14596, para. 94, n.214.

⁸⁸ Consumers may request this assistance by completing and submitting a “Request for Dispute Assistance,” available at <https://consumercomplaints.fcc.gov/hc/en-us/articles/203163650>. Consumers must request assistance from the FCC *before* filing an informal complaint against the company.

⁸⁹ Requests for assistance may be extended further in increments of 30 days.

⁹⁰ The TRS requirements were added to the Communications Act by Title IV of the Americans with Disabilities Act of 1990. Pub. L. No. 101-336, 104 Stat. 327, 366-69 (1990) (codified at 47 U.S.C. § 225). Section 103(a) of the CVAA amended section 225 of the Communications Act to define TRS as “telephone transmission services that provide the ability for an individual who is deaf, hard of hearing, deaf-blind, or who has a speech disability to engage in communication by wire or radio with one or more individuals, in a manner that is functionally equivalent to the ability of a hearing individual who does not have a speech disability to communicate using voice communication services by wire or radio.” CVAA, § 103(a), 124 Stat. at 2755 (codified at 47 U.S.C. § 225(a)(3)).

and receive telephone calls in a manner that is functionally equivalent to the ability of an individual who does not have a disability.⁹¹

Generally, during a TRS call, a communications assistant relays the call between parties by converting everything that a text caller with a hearing or speech disability types (on a text telephone or computer) or signs in American Sign Language (ASL) into voice for the hearing party, and typing or signing in ASL everything that the voice user responds back to the person with a disability.⁹² Another type of relay service, speech-to-speech relay service (STS), enables a person with a speech disability to make telephone calls using his or her own voice (or an assistive voice device).⁹³ STS communications assistants are specifically trained to understand difficult-to-understand speech, which enables them to repeat what the caller says in a manner that makes the caller's words clear and understandable to the called party.⁹⁴ All forms of TRS are available to users without cost and must meet certain mandatory minimum standards set by the Commission.⁹⁵

STS may be particularly useful for people with cognitive disabilities. Sometimes speech disabilities or "spoken language disabilities," which can affect one's ability to communicate by telephone, may occur alongside cognitive disabilities such as brain injury, autism spectrum disorder, and attention deficit hyperactivity disorder.⁹⁶ Similarly, individuals who acquire

⁹¹ 47 U.S.C. § 225(a)(3).

⁹² *Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, Report and Order, Order on Reconsideration, and Further Notice of Proposed Rulemaking, 19 FCC Rcd 12475, 12480, para. 3, n.18 (2004) (describing how a traditional TRS call works); *see also* 47 CFR § 64.601(a)(17) (defining Internet Protocol Relay Service, which permits people with hearing or speech disabilities to communicate in text using an Internet Protocol-enabled device via the Internet), 64.601(a)(40) (defining video relay service, which allows people with hearing or speech disabilities who use sign language to communicate with voice telephone users over a broadband Internet connection using video equipment that allows the communications assistant to view the party's signed conversation and relay the conversation back and forth by signing what the voice telephone user says to the deaf or hard of hearing user and responding in voice to the voice telephone user). Yet another form of TRS, captioned telephone service, permits people who can speak, but who have difficulty hearing over the telephone, to simultaneously listen to the other party and read captions of what that party is saying. *See Telecommunications Relay Services, and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, Declaratory Ruling, 18 FCC Rcd 16121 (2003); *Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, Declaratory Ruling, 22 FCC Rcd 379 (2007) (approving an Internet version of captioned telephone service); 47 CFR § 64.601(a)(16).

⁹³ *See* 47 CFR § 64.601(30).

⁹⁴ *See* FCC, *Speech-to-Speech Relay Service*, <https://www.fcc.gov/consumers/guides/speech-speech-relay-service> (last visited Aug. 31, 2016). STS does not require a special telephone.

⁹⁵ *See generally* 47 CFR § 64.604 *et seq.*; FCC, *Telecommunications Relay Services*, <https://www.fcc.gov/consumers/guides/telecommunications-relay-service-trs> (last visited Aug. 31, 2016).

⁹⁶ *See* American Speech-Language-Hearing Association, *Spoken Language Disorders*, <http://www.asha.org/Practice-Portal/Clinical-Topics/Spoken-Language-Disorders/> (last visited Sept. 1, 2016); *see also* Bilingualistics, *Intellectual Disability Speech Implications and Resources*, <http://bilingualistics.com/disorder/intellectual-disability/> (last visited Sept. 22, 2016).

cognitive disabilities as a result of strokes may experience aphasia, which can result in difficulty expressing oneself when speaking, or difficulty understanding speech.⁹⁷ Additionally, people with cognitive disabilities may have other disabilities, such as cerebral palsy, that may impact their speech abilities.⁹⁸

C. Other Federal Accessibility Policy

There are several other federal laws that create legal protections for people with disabilities in general, but which may have particular significance for ensuring that ICT is accessible to people with cognitive disabilities in certain contexts. These include the following:

- The Individuals with Disabilities Education Act (IDEA) governs how states and public agencies provide early intervention, special education, and related services to infants, toddlers, children, and youth with disabilities.⁹⁹ One of the purposes of the IDEA is “to ensure that all children with disabilities have available to them a free appropriate public education that emphasizes special education and related services designed to meet their unique needs and prepare them for further education, employment, and independent living.”¹⁰⁰ In developing the child’s individualized education program (IEP), the school must consider, among other things, whether the child needs assistive technology devices or services, which may, in turn, require the provision of accessible ICT.¹⁰¹
- The Rehabilitation Act of 1973 contains various provisions prohibiting discrimination on the basis of disability.¹⁰² For example, section 501 of the Rehabilitation Act requires federal employers to provide reasonable accommodations for employees with disabilities who need these accommodations to perform the essential functions of their jobs.¹⁰³ Section 504 requires, among other things, access by people with disabilities to programs or activities that are conducted by federal agencies or that receive federal financial assistance.¹⁰⁴ Section 508 of the Rehabilitation Act requires electronic and information

⁹⁷ See National Stroke Association, *Aphasia*, <http://www.stroke.org/we-can-help/survivors/stroke-recovery/post-stroke-conditions/physical/aphasia> (last visited Sept. 1, 2016).

⁹⁸ See Intellectual Disability, *Introduction to Cerebral Palsy*, <http://www.intellectualdisability.co.nz/disability.php?id=18> (2010).

⁹⁹ See U.S. Department of Education, *Building the Legacy: IDEA 2004*, <http://idea.ed.gov/> (last visited Aug. 31, 2016); 20 U.S.C. § 1400 *et seq.*

¹⁰⁰ 20 U.S.C. § 1400(d)(1)(a).

¹⁰¹ 20 U.S.C. § 1414(d)(3)(B)(v).

¹⁰² See Disability.gov, *Rehabilitation Act of 1973*, <https://www.disability.gov/rehabilitation-act-1973/> (last visited Aug. 31, 2016).

¹⁰³ See U.S. Equal Employment Opportunity Commission, *Procedures for Providing Reasonable Accommodation for Individuals with Disabilities*, https://www.eeoc.gov/eeoc/internal/reasonable_accommodation.cfm (last visited Sept. 13, 2016). Section 501 also requires affirmative action to hire and advance in employment qualified individuals with disabilities. 29 U.S.C. § 791(b).

¹⁰⁴ See 29 U.S.C. § 794.

technology procured and maintained by federal agencies to be accessible to people with disabilities, including employees and members of the public.¹⁰⁵

- The Americans with Disabilities Act of 1990 (ADA) prohibits discrimination and ensures equal opportunity for individuals with disabilities in employment, state and local government services, transportation, and public accommodations and services operated by private entities.¹⁰⁶

The mandates contained in the Communications Act requiring manufacturers and service providers to make their telecommunications and advanced communication products and services accessible to and usable by individuals with cognitive and other types of disabilities can assist entities covered by these other federal laws to meet their accessibility obligations.

D. Policy Statements

The rights of people with cognitive disabilities have been informed by non-binding policy statements, in addition to the statutes described above. Government stakeholders and non-governmental organizations have published policy statements that advocate for the rights of people with cognitive disabilities, including their right to accessible ICT.

1. The Convention on the Rights of Persons with Disabilities

The United Nation's Convention on the Rights of Persons with Disabilities (CRPD)¹⁰⁷ was drafted in response to a finding that people living with disabilities in many parts of the world lack access to the same opportunities, including education, employment, and health care, as the mainstream population. Many of these individuals also must cope with limited mobility, lack of integration into society, and reduced access to information.¹⁰⁸ The CRPD, among its other themes, calls for ensuring access to people with disabilities by removing barriers to information, communications, and other services.¹⁰⁹ Signatories to this treaty generally are expected to:

undertake or promote research and development of, and to promote the availability and use of new technologies, including information and communications technologies, mobility aids, devices and assistive technologies, suitable for persons with disabilities, giving priority to technologies at an affordable cost . . .¹¹⁰

¹⁰⁵ 29 U.S.C. § 794d.

¹⁰⁶ 42 U.S.C. § 12101 *et seq.*; *see also, e.g.*, U.S. Equal Employment Opportunity Commission., *Disability Discrimination*, <https://www.eeoc.gov/laws/types/disability.cfm> (last visited Aug. 31, 2016); U.S. Department of Justice, *The Americans with Disabilities Act of 1990 and Revised ADA Regulations Implementing Title II and Title III*, https://www.ada.gov/2010_regs.htm (last visited Aug. 31, 2016).

¹⁰⁷ United Nations, *Convention on the Rights of Persons with Disabilities (CRPD)*, available at <https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities/convention-on-the-rights-of-persons-with-disabilities-2.html> (last visited Oct. 5, 2016).

¹⁰⁸ United Nations, *Convention on the Rights of Persons with Disabilities: Why a Convention?*, <http://www.un.org/disabilities/convention/questions.shtml> (last visited Sept. 1, 2016).

¹⁰⁹ *CRPD*, Art. 9, § 1.

¹¹⁰ *Id.*, § 1(g).

President Obama added the United States as a signatory to the CRPD on July 24, 2009.¹¹¹ Although the U.S. Senate has yet to ratify the CRPD,¹¹² the treaty has been ratified by 166 other countries,¹¹³ and serves as an important global statement on the rights of people with disabilities, including people with cognitive disabilities.

2. FCC Public Notice on Access to Televised Emergency Information

On September 30, 2016, the Commission released a public notice containing recommendations on how to impart information about emergencies on television to people with cognitive disabilities.¹¹⁴ This notice recommends that emergency notifications and information shown on TV be presented in a manner that uses plain and understandable English; avoids complicated and lengthy sentences; provides multiple means of content representation, such as pictorial or auditory descriptions; and avoids, where possible, scrolls unrelated to the emergency during the broadcast of emergency information. The Notice also recommends that information about necessary precautions and emergency response be made clear, using easy-to-understand language and concrete steps. Finally, it recommends that program providers and distributors share these recommendations with service personnel who develop emergency notifications, to alert them about ways to make their emergency information more effective for people with cognitive disabilities.

3. Coleman Institute Declaration: The Rights of People with Cognitive Disabilities to Technology and Information Access

The Coleman Institute, together with a coalition of leading disability organizations and individuals, has drafted a formal declaration, *The Rights of People with Cognitive Disabilities to Technology and Information Access*,¹¹⁵ which invites interested parties to take the following pledge:

We hereby affirm our commitment to equal rights of people with cognitive disabilities to technology and information access and we call for implementation of these rights with deliberate speed.¹¹⁶

¹¹¹ U.S. International Council on Disabilities, *CRPD Ratification Advocacy*, <http://www.usicd.org/index.cfm/crpd-ratification-advocacy> (last visited Sept. 1, 2016).

¹¹² *Id.*

¹¹³ United Nations, *Division for Social Policy and Development, Disability*, <https://www.un.org/development/desa/disabilities/> (last visited Sept. 1, 2016).

¹¹⁴ These recommendations are contained in a public notice that also discusses obligations under section 79.2 of the Commission's rules for video programming distributors to make televised emergency information accessible to people who are deaf, hard of hearing, blind or visually impaired. *See Reminder Regarding Obligations to Make Televised Emergency Information Accessible to Viewers Who Are Deaf, Hard of Hearing, Blind or Visually Impaired and Recommendations to Improve Access for Viewers with Cognitive Disabilities*, Public Notice, DA 16-1116 (Sept. 30, 2016).

¹¹⁵ Coleman Institute Declaration, *supra* note 4.

¹¹⁶ Coleman Institute Declaration, *supra* note 4.

Since being announced in October 2013, the declaration has been endorsed by 604 organizations and 1,012 individuals.¹¹⁷

4. PCPID: Leveling the Playing Field: Improving Technology Access and Design for People with Intellectual Disabilities

In 2015, the President’s Committee for People with Intellectual Disabilities (PCPID) released a report “to advise the President and the Secretary of Health and Human Services about the role of technology in improving the quality of life for people with [intellectual disabilities] and ensuring their full citizenship rights.”¹¹⁸ The goals of this report were to (1) “increase the cognitive accessibility of technology that is part of the fabric of everyday lives and strengthen federal policies to ensure that people with [intellectual disabilities] have equal access to everyday technology,” and (2) “increase the availability, quality, and affordability of cognitive support technologies through policies, practices, development, and research.”¹¹⁹

Among other conclusions, the PCPID found that “mainstream technologies are not often enough designed with the needs of individuals with [intellectual disabilities] in mind,” and therefore “can create – rather than remove – significant obstacles to independent participation in life activities and communities.”¹²⁰ The report identifies barriers and makes recommendations to help improve access to and the design of technology used by people with intellectual disabilities in the areas of education, community living, employment and economic well-being, and health and wellness.¹²¹

5. Chairman’s Awards for Advancement in Accessibility

The Chairman’s Awards for Advancement in Accessibility (Chairman’s AAA) is a Commission project to recognize outstanding private and public sector ventures – by individuals, organizations, academics, companies and government agencies – that advance accessibility for people with disabilities. Awards are presented for the development of mainstream or assistive technologies introduced into the marketplace, the development of standards, and the implementation of best practices that program recognizing products, services, standards and other innovative developments that improve the experience of people with disabilities in

¹¹⁷ Coleman Institute, *Endorsements*, <http://www.colemaninstitute.org/declaration-endorsements> (last visited Sept. 22, 2016).

¹¹⁸ PCPID Report, *supra* note 40, at iii.

¹¹⁹ *Id.* at iv.

¹²⁰ *Id.* In this context, the PCPID Report explains that “mainstream technologies” refers to “any technology that is intended for general use rather than for use entirely or primarily by people with disabilities.” *Id.*, n.2.

¹²¹ *Id.* at iv.

telecommunications and technology.¹²² In June of 2016, two of the winning nominees won for their innovations in addressing the needs of people with cognitive disabilities.¹²³

VI. Accessibility Solutions for an Inclusive ICT Ecosystem

A. Obtaining Consumer Input

The accessibility and usability of communication products and services for people with cognitive disabilities can best be achieved by considering the needs of this population and developing solutions to address those needs during the design and development of such offerings.¹²⁴ Retrofitting equipment and software can be expensive,¹²⁵ and sometimes retrofitted equipment may be brought to market too late for it to be useful to the consumers for whom it is intended.¹²⁶ To ensure a more effective result with minimal burdens to companies and their developers, it is important that accessible features be incorporated during the early stages of technology development.

¹²² See FCC, *Chairman's Awards for Advancement in Accessibility*, <https://www.fcc.gov/general/chairmans-awards-advancements-accessibility> (last visited Oct. 5, 2016).

¹²³ One of these awards was given to SOS QR, an emergency record and notification smartphone app that provides a one-touch interface to transmit an emergency message to a pre-populated list of emergency contacts, who receive a call, message, and map with the user's current location. The app also populates the phone's lock screen with a code that, when scanned by emergency services, provides critical information about the user and simultaneously notifies emergency contacts. A second award went to Unus Tactus, an app to simplify access to smartphones, which includes a one-touch photo dialer, a call-for-help button, and "geofence" alerts to notify a list of contacts if the device leaves a given area.

¹²⁴ See PCPID Report, *supra* note 40, at iv (finding that many of the obstacles facing people with cognitive disabilities in using ICT "can be overcome when cognitive accessibility . . . is considered during the design and implementation of new technologies").

¹²⁵ One instance in which retrofitting has proved to be costly is the provision of telecommunications relay services (TRS), an FCC program now costing telephone subscribers over \$1 billion dollars per year. TRS, which relies on third party operators to relay calls between people with and without disabilities, is a solution to make up for the lack of mainstream access to our nation's telephone system. See *supra* Part V.B (describing various types of TRS).

¹²⁶ See, e.g., Brian Wentz et al., *Retrofitting Accessibility: The Legal Inequality of After-the-Fact Access for Persons with Disabilities in the United States*, 16(11) *First Monday* (Nov. 7, 2011), <http://journals.uic.edu/ojs/index.php/fm/article/view/3666/3077#author> (noting also that the accessible versions of ICT are often made only after the technology is no longer current, as the cycle of change is faster than the cycle of creation of accessibility); see also National Council on Disability, *supra* note 42, at 77. For instance, the wireless industry was directed by the Commission to make its phones compatible with TTY technology by 1997. By the time these retrofits took place in 2002, most of individuals who could benefit from the modifications had stopped using TTYs with wireless services. Karen Peltz Strauss, *A New Civil Right: Telecommunications Equality for Deaf and Hard of Hearing Americans* 396-98 (2006).

In particular, the production of effective and accessible consumer products requires testing by and input from targeted users.¹²⁷ Although design guidelines and best practices are important to a company's efforts to incorporate accessibility features, there is no replacement for hands-on user testing, which can identify design and usability solutions for specific users.¹²⁸ Indeed, it is far less likely that the resulting technology being developed will effectively meet the needs of users with disabilities without the input and guidance of these individuals early on in the design stage.¹²⁹ This is especially true when designing for users with cognitive disabilities, as developers may have little experience in working with this population,¹³⁰ and therefore may not understand their functional needs with adequate precision.¹³¹

The DAC Best Practices affirm this approach. These recommend that “[w]here appropriate, ICT stakeholders should include people with cognitive disabilities and their representatives in product and service design and development processes, as early as possible, to identify unmet user needs for features, products or services, and evaluate the accessibility and usability of solutions, features, and functions, including, for example, market research, product testing, demonstrations, or trials.”¹³² Unfortunately, research shows that, in the past, many developers have not included people with disabilities in their testing panels.¹³³ Reasons given for this vary, from uncertainty about how to work with this population in a testing panel¹³⁴ to how to get these test subjects' informed consent,¹³⁵ to a reluctance by company decision-makers to

¹²⁷ See *supra* Part V.A; see also Gentry, *supra* note 38, at 682 (stating that “partnerships between device and application developers and people in the disability community should be fostered to better shape products that accommodate and support users with varied abilities”).

¹²⁸ See LoPresti, *supra* note 18, at 34.

¹²⁹ *Id.* at 35.

¹³⁰ There appears to be a significant amount of confusion about cognitive disabilities among Americans in general, and particularly by those who report that they do not know anyone with a cognitive disability. See, e.g., Maria Shriver, *The Shriver Report Snapshot: Insight into Intellectual Disabilities in the 21st Century – Full Findings* (July 24, 2015), <http://mariashriver.com/blog/2015/07/shriver-report-snapshot-insight-into-intellectual-disabilities-21st-century-full-findings/>.

¹³¹ See LoPresti, *supra* note 18, at 34 (“Because few system designers and developers have experience working with people with cognitive disabilities, they lack good intuitions about their capabilities and needs.”).

¹³² *Id.*

¹³³ *Id.*

¹³⁴ *Id.* (noting that “[i]nformal discussion with interested developers suggests two obstacles: uncertainty about how to work with people with cognitive disabilities and concern about obtaining approval for inclusion of people with cognitive disabilities from institutional review board”) (internal citations omitted).

¹³⁵ *Id.* at 35 (suggesting that consent auditors or surrogates could be used to address this concern).

approve such testing,¹³⁶ perhaps out of concerns that this is not a sufficiently sized market to pursue.¹³⁷

It is likely that many of these concerns can be addressed by having industry trade associations work with consumer organizations to develop guidance for industry researchers on how to accommodate people with cognitive disabilities during the product testing stage. Additionally, concerns about informed consent, and minimization of harm to test subjects, can be addressed by utilizing consent auditors or consent surrogates, briefing participants to ensure that their expectations are not unfairly raised by the test, and adopting procedures such as terminating sessions if frustration or discomfort with the process arises.¹³⁸

In the DAC Best Practices, consumer and industry stakeholders confirm the need to take measures that can help the ICT community stay informed about the needs of and solutions for people with cognitive disabilities as technologies continue to evolve. These measures include, where appropriate, “proactively seeking out and maintaining collaborative relationships with people with cognitive disabilities either individually or through organizations that have established expertise with or represent these individuals.”¹³⁹ The recommendations made in these Best Practices underline the importance of utilizing the expertise of consumers with cognitive disabilities in the research, design, and development of communications products and services. Consumers typically know best what features are useful to meet their accessibility needs, and failure to consider their advice or recommendations could prove detrimental to their ability to use technologies once deployed.

Helpful consumer input also can come from a company’s own employees, to the extent it employs people with cognitive disabilities. In fact, some ICT companies are making impressive efforts in doing so. For example, Microsoft recognizes that, in order to build the best products for everyone, it needs to have a diverse and inclusive workforce across all abilities, and launched its Autism Hiring Program in 2015 to attract talent to Microsoft by building an inclusive approach to both hiring and supporting individuals.¹⁴⁰

¹³⁶ *Id.* at 34.

¹³⁷ See generally Peltz Strauss, *supra* note 126, at 401-02.

¹³⁸ LoPresti, *supra* note 18, at 35; see also Shawn L. Henry, *Just Ask: Integrating Accessibility Throughout Design, The Basics: Involving People with Disabilities in Your Project* (2007), <http://www.uiaccess.com/accessucd/involve.html> (providing guidance on securing input from consumers with disabilities to ensure accessible design). In testing parlance, a consent surrogate is used for “obtaining from a surrogate decision maker the valid informed consent to participate in research for an adult subject who is cognitively impaired, lacks capacity, or has a serious or life-threatening disease.” Univ. of Calif., Office of Research, *Guidance on Surrogate Consent for Research* at 1 (2003), http://cphs.berkeley.edu/Surrogate_consent_Guidance.pdf.

¹³⁹ DAC Best Practices at 2.

¹⁴⁰ See Microsoft, *Kyle Schwaneke: Unique Microsoft Hiring Program Opens More Doors to People with Autism*, <http://news.microsoft.com/stories/people/kyle-schwaneke.html> (last visited Sept. 26, 2016). Microsoft has also combined its best practices into a new ‘Disability Inclusive Hiring’ website where potential employees can check out open jobs, role models, Microsoft’s partnership on supported employment, its internal disability community, and details of its centralized accommodation program.

B. Providing Access to Off-the-Shelf Equipment

For years, technology for people with disabilities, including those with cognitive disabilities, centered on specialized assistive technology, which was frequently expensive, hard to find, and often subsidized by federal or state programs.¹⁴¹ This was largely due to a general reliance on communications hardware built exclusively for people without disabilities – i.e., the general public – that could not easily be retrofitted or adapted to meet the needs of people with disabilities. Moreover, in the past, some accessibility experts expressed concerns that mainstream devices could not provide the durability and user interface requirements that people with disabilities need. That concern stemmed from the observation that mainstream devices were designed to match the general public’s preferences for “very small phones, with small screens and tiny keyboards rather than button or touch screen operation[s].”¹⁴² These miniaturized features were perceived as being at odds with a need for devices that accommodated low-dexterity, or displayed pictorial images.¹⁴³

However, in recent years, off-the-shelf devices are providing solutions for people with cognitive disabilities. In addition to the lower costs of these devices – which is achieved through economies of scale when they are widely marketed¹⁴⁴ – off-the-shelf devices are easier to find and far more adaptable in an ever-evolving communications environment. In particular, universally available touch screens, screen readers, and voice recognition capabilities have made mainstream technologies more accessible for individuals with cognitive disabilities. In addition, mainstream mobile devices have become more varied in their screen and device sizes, allowing these devices to meet more diverse accessibility needs. For example, some manufacturers have introduced the “phablet,” a smartphone-tablet hybrid that may be more easily accessed by people with limited dexterity.¹⁴⁵ Device makers are also creating more durable devices that are shatter-resistant,¹⁴⁶ a feature that also benefits those with limited dexterity. These advanced features, as well as the portability, relative affordability, availability, and data processing and storage capabilities of mainstream communications devices such as smartphones, tablets, electronic

See Microsoft, *Inclusive Hiring for People with Disabilities*, <https://www.microsoft.com/en-us/diversity/inside-microsoft/cross-disability/hiring.aspx> (last visited Sept. 26, 2016).

¹⁴¹ See, e.g., PCPID Report, *supra* note 40, at 1. Approximately two-thirds of states in America have programs that distribute free or reduced-cost specialized customer premises equipment for people with disabilities, though it is uncertain how many of these programs provide assistive devices specifically for people with cognitive disabilities. More information about these programs can be found at the home page of the Telecommunications Equipment Distribution Program Administration, www.TEDPA.org.

¹⁴² LoPresti, *supra* note 18, at 37.

¹⁴³ See, e.g., *id.*

¹⁴⁴ See *id.* at 36.

¹⁴⁵ See, e.g., Max Parker, *7 Best Phablets You Can Buy in 2016* (Aug. 22, 2016), http://www.trustedreviews.com/best-phablets-2015_round-up).

¹⁴⁶ See, e.g., Alex Angove, *Best Waterproof Phones* (Mar. 23, 2016), <https://www.whistleout.com.au/MobilePhones/Guides/Best-waterproof-phones> (“Waterproof and resistant smartphones are the next big thing. We’ve been waiting a while for manufacturers to put a little more thought into durability, and the time is finally upon us.”).

readers, and global positioning systems, offer great potential for people with cognitive disabilities.

The most promising trend in today's communications ecosystem, however, is the movement toward equipment and software that is customizable to the specific needs and abilities of each individual user.¹⁴⁷ The ability to customize ICT devices can markedly improve the accessibility of offerings in ways that previously were not possible with fixed hardware. In recognition of the benefits that customizing ICT products and services can have for people with cognitive disabilities, the DAC Best Practices recommend that ICT stakeholders, where appropriate, "make efforts to incorporate features that allow for personalization and customization of features and functions that facilitate the accessibility and usability of ICT and applications for people with cognitive disabilities."¹⁴⁸ According to the DAC, taking such measures would be "in furtherance of the principles of universal design and to minimize the need for costly and difficult-to-find accessories."

C. Accessibility Solutions in Response to Functional Limitations

Below are various accessibility solutions that are presently available in ICT technologies to meet the specific functional needs of many people with cognitive disabilities. Some of these solutions may be built into a product's hardware or software at the time of sale, others may be available through customization of off-the-shelf devices or software modifications, and still others may enhance device capabilities through third party applications.¹⁴⁹

1. Functional Need: Memory

Functional difficulties in memory can impact the ability to recall what a person has learned over time.¹⁵⁰ Users may experience difficulties with their working (immediate) memory, short-term memory, long-term memory, or a combination of all types of memory.¹⁵¹ When memory deficits occur, they can seriously impact the user's ability to effectively access and use smartphones or other technology. Accessibility solutions to mitigate memory-related issues can include the following.

Alternative Input Functions. At the most basic level, a speed dial or voice dial function on a smartphone can enable a user with a cognitive disability who cannot easily input numbers to place a telephone call.¹⁵²

¹⁴⁷ Mechling, *supra* note 39, at 479-498.

¹⁴⁸ DAC Best Practices at 2.

¹⁴⁹ For a discussion of best practices to follow in designing mobile applications for people with cognitive disabilities, see Jonathan Avila, *Designing Mobile Apps for Use by People with Cognitive Disabilities* (Oct. 5, 2016), <http://www.ssbartgroup.com/blog/designing-mobile-apps-for-use-by-people-with-cognitive-disabilities/>.

¹⁵⁰ See Center for Persons with Disabilities, Utah State Univ., *supra* note 11.

¹⁵¹ *Id.*

¹⁵² For example, the UnusTactus app provides a one touch photo dialing system for users with cognitive disabilities. UnusTactus, *The App with T.L.C.: Touch, Locate, Call*, <http://www.unustactus.com/> (last visited Sept. 16, 2016). See also CTIA – the Wireless Association, Comments, CG Docket 10-213 (filed

Passwords. An option to use biometric solutions, such as fingerprint or iris scans for optical recognition, can assist individuals who have difficulty remembering passwords.¹⁵³ More problematic are users whose memory deficits make them unlikely to remember that a password or password substitute is required. These users may have even more need to protect the security of their devices, as their memory difficulties may make it necessary to use their devices to store personal information, such as Social Security numbers, PIN numbers, or other sensitive information. Being able to customize devices to display clear instructions that reduce the potential for error is one way to address password challenges. For example, a screen could state “enter maiden name” instead of “enter passcode,” or state clear instructions for entering a biometric passcode.¹⁵⁴

Device Operation and Navigation. Individuals with memory deficits might not remember how to locate a certain function, operate a device, or reach a particular contact. They also may be unable to address error messages, due to an inability to remember the information previously entered. These limitations can be addressed by simplifying both screen layouts¹⁵⁵ and the commands and prompts needed to use a device’s functions.¹⁵⁶ For example, a device may be customized to reduce the number of steps required to reach certain functions, and to increase error tolerance. The device may also be customized to eliminate all but the most basic functions, in order to minimize confusion. Additionally, the device might offer users the option to use pictures or images to reach contacts.¹⁵⁷

June 22, 2016) (CTIA CVAA Report Comments) at 14. CTIA submitted these comments in response to a Public Notice seeking comment on the Commission’s Biennial Report to Congress on the Twenty-First Century Communications and Video Accessibility Act (CVAA). For additional discussion of this legislation, *see supra* Part V.A.2.

¹⁵³ *See generally* DAC Best Practices at 1 (noting that at the FCC’s Summit on Cognitive Disabilities in October 2015, consumer stakeholders raised concerns about “limited memory or recall skills” that can make remembering passwords a challenge). The DAC Best Practices document explains that, according to ICT stakeholders, this can be addressed by using “innovative device unlocking capabilities,” such as fingerprints, facial or optical recognition functions.

¹⁵⁴ Another advance to assist with the entry of passwords can be found on mobile devices such as the Samsung Galaxy S, which has a screen keyboard that includes a number row and common symbols in addition to letters. This feature eliminates the obstacle of needing to shift between two keyboards in order to type complex passwords, which are now commonly required for many transactions. *See* Samsung, *What Is Special about the On Screen Keyboard for the Galaxy Tab S?* (Jan. 18, 2016), http://www.samsung.com/sa_en/support/skp/faq/1052205.

¹⁵⁵ For example, Great Call’s Jitterbug Smart offers a simplified menu screen, presented as a list of commonly used features in large font. *See* Greatcall, *Jitterbug Smart*, <https://www.greatcall.com/phones/jitterbug-smart-smartphone-for-seniors> (last visited Sept. 20, 2016).

¹⁵⁶ An example of simplified commands is found in Samsung Model SM-G935R4, which offers Simple Instructions, instructions and messages that are displayed on screen using simple language, as well as Assistance Instructions, provided when the user needs to provide input. *See* Global Accessibility Reporting Initiative (GARI), *Find Accessible Devices & Apps: SM-G935R4*, <https://www.gari.info/findphones-detail.cfm?productid=2210&iframeid=> (last visited Sept. 20, 2016).

¹⁵⁷ *See* DAC Best Practices at 1.

Information Storing Features. The ability of smartphones to store contact information, shopping lists and daily to-do lists can provide users who have frequent memory loss with a specified location for the retrieval of such information.

2. Functional Need: Organizational Skills

Prompting functions on mobile devices can assist individuals with memory and organizational deficits by reminding them to perform tasks at the appropriate times, or by providing information through a series of prompts related to steps in a task.¹⁵⁸ The following are examples of how these functions can be useful to people with cognitive disabilities.

Alerting Functions. A mobile device with calendar and alert functions can assist users in daily tasks and skills essential for independent living, as well as help individuals remember and perform the steps of a complex task.¹⁵⁹ Alert functions also can aid in keeping an individual on schedule. As noted above, such cues can be especially helpful in assisting employees to fulfill their job functions, for example, by providing instructional aids and task sequence support to prompt the completion of responsibilities given by an employer.¹⁶⁰ Similarly, to promote independent living, a smartphone can remind users to brush their teeth, lock the door, turn off the stove, and even keep track of money spent.¹⁶¹

Remote and Situational Guidance. Mobile devices equipped with a prompt function also can provide situational guidance through global positioning and other sensor information.¹⁶² The devices can detect context, such as the user's locations, and the state of the task being performed, to determine whether reminders are needed.¹⁶³ Using such functions, remote caregivers or

¹⁵⁸ LoPresti, *supra* note 18, at 32; *see also* Gentry, *supra* note 38, at 682 (noting that persons with cognitive disabilities in its study used task reminders with much more frequency than the general population, and that six reminder alarms “may be a minimum number of reminders to help him/her move from task to task across the workday”).

¹⁵⁹ Mechling, *supra* note 39, at 479. Many mobile devices offer robust alerting functions. For example, Blackberry offers a number of functions to assist users with cognitive disabilities, including alerts and notifications. Blackberry, *Accessibility*, <http://us.blackberry.com/legal/accessibility.html> (last visited Sept. 16, 2016). Applications are also available that sync with a user's device to provide organizational guidance. For example, MeMinder is an app that syncs with the Apple watch and displays events in an easy-to-read scrolling “day planner” view on the watch. Portal 5B, LLC, *MeMinder | Plus Calendar Event & Reminder Creator Tool with Calendar Events Viewer for Apple Watch*, <https://itunes.apple.com/us/app/meminder-plus-calendar-event/id1000335909?mt=8> (last visited Sept. 16, 2016).

¹⁶⁰ *See supra* Part III.C.

¹⁶¹ Mechling, *supra* note 39, at 489. “When compared to a traditional written schedule, [research] demonstrated that the . . . schedule prompting software was more effective than the written schedule for prompting initiation of tasks.” *Id.* Other studies report that without such technology, youths with intellectual disabilities or brain injury had to rely on others to remind them, or on unreliable efforts to remember things independently. LoPresti, *supra* note 18, at 32.

¹⁶² Radiofrequency beacons can be used to provide more information indoors, with global positioning systems (GPS) used in outdoor environments. LoPresti, *supra* note 18, at 32.

¹⁶³ *Id.*

others, such as job coaches, can monitor the user's success at each task performed, and provide guidance where necessary.¹⁶⁴ For example, an employee who is asked to operate a certain piece of office equipment with which he is unfamiliar can turn to a remote job coach, who can identify the equipment through the employee's device camera, and then provide video or spoken instructions from another location. The ability of remote caregivers or job coaches to assist in cases when problems arise for individuals with cognitive disabilities can bypass the need for expensive or time-consuming in-person visits that are needed to enable people with cognitive disabilities to retain employment or to continue living independently. This is particularly important in locations where the availability of professional assistants is limited or subject to high turnover,¹⁶⁵ and can alleviate demands placed on family members or others who are responsible for the care of people with cognitive disabilities.¹⁶⁶

3. Functional Need: Information Processing

People with cognitive disabilities have various ways of processing information. Mobile communication devices offer various solutions to address this functional need.

Time Tolerance. Some individuals who confront challenges when processing information simply need extra time to comprehend and respond to incoming stimuli. For example, they may find that the content on a screen disappears before they have had time to enter information or otherwise react. Or they might find that a person finishes speaking before they have time to formulate a response. The ability to control how long content remains on a device's screen can provide users with the time they need to engage a feature or application.¹⁶⁷ In this fashion, increasing a device's tolerance to remain idle can enable users to more meaningfully interact with a particular technology. Similarly, telephones that allow users to slow the speed of incoming speech may provide individuals with slower processing capabilities the extra time they need to comprehend both conversations that take place in real time and messages that they receive through voice mail.¹⁶⁸

Choice of Alternate Formats. Functional challenges in processing visual information also can prevent users from being able to identify objects. Specifically, users may fail to realize that

¹⁶⁴ See Gentry, *supra* note 38, at 680 (finding that the use of an iPod touch with mobile capabilities as an assistive technology significantly reduced the need for in-person job coaching support by workers with autism spectrum disorders, without reducing functional performance on the job).

¹⁶⁵ LoPresti, *supra* note 18, at 33 (suggesting that generally there is a scarcity of effective caregivers, and that there is a high turnover of professionals in this field).

¹⁶⁶ *Id.* at 32.

¹⁶⁷ Samsung phones now offer "No Screen Timeout," which keeps a phone screen open when the phone displays an alert or a question that requires an answer. This can be helpful for people who find it difficult to decide what to answer, or have difficulty entering the answer quickly. See GARI, *supra* note 156.

¹⁶⁸ For example, newly released telephones manufactured by Panasonic offer a "slow talk control" feature that allows individuals to "slow the speed of speech in real time and when checking voice messages." Panasonic, *Amplified Cordless Phone with Digital Answering Machine – 1 Handset – KX-TGM450S*, <http://shop.panasonic.com/home-and-office/cordless-corded-telephones/amplified-telephones/KX-TGM450S.html> (last visited Sept. 8, 2016).

an image is a representation of a certain object, though they can plainly see the image itself.¹⁶⁹ One solution is to customize a mobile device so that it can be programmed by its user to provide information in alternate formats. For example, an icon accompanying text or audio information could allow users to select between a visual representation or a text representation, or utilize these together to comprehend the material more fully.¹⁷⁰ Other users may need devices that enable the conversion of text into a larger font or an audio format. Making contact lists that are customizable, so that text identification of contacts can be replaced with photographs, can also assist certain individuals.¹⁷¹ Additionally, options to scale size and change placement of icons and function buttons, and to replace interface icons with more easily understood pictorial or audio description options, can provide the flexibility that some users need to make an interface more usable for them.

Videos and Pictorial Depictions. Some individuals with cognitive disabilities may process instructional information more easily when it is provided through still or video images. For example, videos and pictures received, stored, and retrieved on handheld mobile devices can provide “step-by-step instructions for performing multi-step functional skills that may be new or difficult for the learner (i.e., operating a washing machine) and tasks which are performed infrequently ([e.g.,] baking a birthday cake).”¹⁷²

4. Functional Need: Problem-Solving and Decision Making

Functional difficulties in problem solving can impact the ability of individuals to troubleshoot issues that may arise while using communications technology.¹⁷³ Resulting frustrations may lead to the abandonment of the technology. The following are some customization options that can allow users to modify certain elements of their device to alleviate these frustrations.

Simplification of Functionality. An option to modify devices to display extremely simplified interface designs with one-step functionalities can greatly assist users who struggle with problem-solving.¹⁷⁴ The ability to block notifications, updates, and changes to settings, any

¹⁶⁹ See Center for Persons with Disabilities, Utah State Univ., *supra* note 11.

¹⁷⁰ See IBM, *supra* note 45.

¹⁷¹ For example, Samsung offers a Photo Associated Telephone Book, allowing users to add photos of people next to their numbers in the user’s contact list. See GARI, *supra* note 156.

¹⁷² Mechling, *supra* note 39, at 489. Research demonstrates that visual instructions on a handheld device are more effective than cue card systems, and that task steps could be clustered into fewer pictures. This is because it can be easier to navigate through pictures on a device than physically manipulating a card system. *Id.* The visual instructions on a handheld device also can be augmented with voice recordings that contain supplemental information. This method has been shown to decrease duration time spent on each task. *Id.* at 490.

¹⁷³ See Center for Persons with Disabilities, Utah State Univ., *supra* note 11.

¹⁷⁴ For example, Samsung’s “Easy Mode” “configures the user’s home screen to provide larger icons and a simpler layout to help eliminate distractions, enable personalization, and facilitate usage for first-time smartphone users.” See Samsung, *How Do I Enable Easy Mode on my Samsung Galaxy Note 5?* (Feb. 9, 2016), <http://www.samsung.com/ca/support/skp/faq/1099434>. Similarly, Samsung’s Simplified Display enables users to disable or conceal unneeded features/programs or icons. See GARI, *supra* note 156.

one of which can cause people with cognitive disabilities confusion and thus render certain functions useless, is also an important tool to facilitate the use of technologies by these individuals.¹⁷⁵ Some users may also need to lock their devices into one feature or application, so they cannot wander out of that functionality by mistake, or may need an option for an easy return to a feature or program. An enhanced tolerance for error across navigation and interface features would assist many users. Other users may tolerate a more robust device, but may need an option for easy return to a favorite or recently used application.¹⁷⁶ One option is for programmers to develop layers of user options with decreasing levels of complexity to provide a greater opportunity for customization by users.¹⁷⁷ Another helpful feature is voice controlled artificial intelligence, which can be utilized for instant access to other features and applications.¹⁷⁸

Clock. The clock function is an important mobile device feature. For many persons with cognitive disabilities, however, difficulties in telling time cannot be overcome by simply replacing an analog clock with a digital one, as some users may lack the ability to associate numbers with spans of time.¹⁷⁹ These individuals may require the ability to gauge time using alternative formats that incorporate text, pictures, or other symbols beyond the typical analog/digital clock display to represent elapsed time.¹⁸⁰

5. Functional Need: Attention

Individuals who have difficulty focusing their attention may be easily distracted by certain elements of communications technologies that are easily ignored by other people. For example, scrolling text, blinking icons, and pop-up windows can make it difficult or impossible for some people with cognitive disabilities to follow prompts on a visual display or to use information received through these technologies.¹⁸¹ Design principles that provide the ability to

¹⁷⁵ At the Commission’s October 2015 Summit on Cognitive Disabilities, consumer stakeholders raised concerns about the loss of customized feature options when modifications are made to interfaces through software updates. DAC Best Practices, at 1. Though not raised at the event, one option to address this potential barrier may be to forward updates, security alerts, or other critical reminders to a designated caretaker’s device.

¹⁷⁶ For example, Microsoft’s Outlook 2016 offers a “Tell Me What You Want to Do” function that helps people quickly get to features or actions they want. Microsoft, *Do Things Quickly with Tell Me*, <https://support.office.com/en-us/article/Do-things-quickly-with-Tell-Me-f20d2198-17b8-4b09-a3e5-007a337f1e4e> (last visited Sept. 16, 2016).

¹⁷⁷ According to one source, software could be built with a spectrum of complexity, allowing users to “keep clicking until they are comfortable with the level of complexity.” Shpigelman & Gill, *supra* note 43, at 1601.

¹⁷⁸ Mechling, *supra* note 39, at 479.

¹⁷⁹ See, e.g., LoPresti, *supra* note 18, at 35.

¹⁸⁰ See, e.g., *id.* (noting “the difficulties faced by someone with a disability trying to tell the difference in time between 3 and 5,” and urging that “[b]y better understanding the difficulty, technology developers or clinicians might be in a better position to find effective solutions (e.g., a more concrete representation of elapsed time)”).

¹⁸¹ See Center for Persons with Disabilities, Utah State Univ., *supra* note 11.

customize these elements, or to reduce clutter by hiding or removing applications or functions can limit distractions that draw a person’s attention away from a device’s main functionalities.¹⁸²

6. Functional Need: Understanding Text

Individuals with cognitive disabilities may experience a wide spectrum of difficulties in understanding text, ranging from mild reading challenges to illiteracy.¹⁸³ A solution is to have designers write as simply and clearly as possible for their audiences. In addition, the use of screen readers and speech-to-text applications can greatly assist users with functional difficulties in reading and comprehension, by providing information in redundant forms.¹⁸⁴

7. Functional Need: Orientation

Studies have shown that some users with cognitive disabilities may not be able to recognize their surroundings, or may have difficulties in describing their physical locations.¹⁸⁵ If individuals become disoriented or lost, access to mobile devices can enable them to contact caregivers, photograph surroundings, and receive instructions on how to find their way.¹⁸⁶ Likewise, the global positioning functions of a smartphone can enable caregivers to track the location of users with cognitive disabilities, freeing such individuals to travel independently while still affording peace of mind to family and support personnel.¹⁸⁷ The photo and video

¹⁸² *Id.* For example, Apple’s Guided Access feature, which allows users to “disable areas of the screen that are not relevant to a task to limit distraction, and disable certain hardware buttons,” can allow an individual to better focus their attention on their specific objectives. CTIA CVAA Report Comments at 14 (citing Apple, *Use Guided Access with iPhone, iPad, and iPod Touch*, <https://support.apple.com/en-us/HT202612> (last visited June 22, 2016)). Similarly, Windows’ Microsoft OneNote “assist[s] users with cognitive disabilities to sustain attention while the device is in focus mode.” CTIA CVAA Report Comments at 14 (citing OFFICEBLOGS, *Learning Tools for OneNote Learning Improves Learning for All* (Jan. 19, 2016), <https://blogs.office.com/2016/01/19/learning-tools-for-onenote-improves-learning-for-all/>). Windows 10 also has a number of features that can be used to remove distractions and improve attentiveness. For example, people can remove the desktop background, turn off animations and use the Quiet Hours feature to choose which apps display notifications and adjust their behavior. Microsoft, *Accessibility in Windows 10: A Guide for Educators* (5th ed. 2015); see also LoPresti, *supra* note 18, at 31; DAC Best Practices at 1 (identifying the ability to “control the complexity of user interfaces by selectively revealing or hiding features” as a possible accessibility solution).

¹⁸³ See Center for Persons with Disabilities, Utah State Univ., *supra* note 11 (“An estimated 15-20% of the population, including many of the brightest minds of recent generations such as Albert Einstein, Thomas Edison, and Henry Ford, has some sort of language or text comprehension difficulty.”).

¹⁸⁴ Applications and other software can also be used to assist these users. For example, applications can provide natural speech screen readers to facilitate access for those with dyslexia or low literacy. See, e.g., Browsealoud, *Websites made more accessible with easy speech, reading and translation tools*, <https://www.texthelp.com/en-us/products/browsealoud.aspx> (last visited Sept. 16, 2016).

¹⁸⁵ Mechling, *supra* note 39, at 486.

¹⁸⁶ *Id.*

¹⁸⁷ *Id.* Activity trackers can even advise caregivers remotely on the extent to which a user has moved about inside a residence, thereby informing caregivers when their family member has been immobile for an extended period of time. One example is HTC’s UA HealthBox and related apps (My Fitness Pal, etc.), which can be useful for caregivers in remotely monitoring an individual with cognitive disabilities,

capabilities of the smartphone, such as front and rear facing cameras, can enable users to send visual images to caregivers, who can then more easily orient and navigate these users remotely.¹⁸⁸ Additionally, augmented reality tools, which use a mobile device’s camera to create “real-time views of a user’s surroundings and incorporate information from digital sources, like navigation aids and maps, can allow users with cognitive disabilities to gain a better understanding of where they are going.”¹⁸⁹ Enabling customizable options to facilitate more seamless remote assistance from users’ support networks would enhance the device’s utility in these situations.

VII. Looking Ahead: Taking the Steps Needed for Full Integration

Information and communications technologies enable us to connect, educate, inform, and entertain. ICT has become the classroom in which we share ideas, the mentor who guides us through new environments, and “the campfire around which we tell our stories.”¹⁹⁰ ICT has expanded our lives, and our potential, in truly remarkable ways.

As new technologies emerge, we need to ensure that people with cognitive disabilities are not left behind. ICT can empower these individuals to achieve more independent, fulfilling lives. The DAC Best Practices point out that people with cognitive disabilities have the potential to use more information and communications technologies in the future, given – among other things – the decreasing cost of new technology, the greater availability of technology through public programs, and the “rapid emergence of technologies that are particularly useful to people with cognitive disabilities.”¹⁹¹ But this can only happen with concentrated and sustained efforts to ensure the accessibility of ICT to these individuals. Otherwise, many will find themselves unable to keep pace in a rapidly evolving digital world and economy. We must ensure that the ability to access ICT increases, rather than diminishes, as technologies advance.¹⁹²

as well as for individuals with memory loss interested in recording exercise and health factors. HTC, *UA HealthBox: Your Connected Fitness System*, <http://www.htc.com/us/fitness/ua-healthbox/> (last visited Sept. 26, 2016).

¹⁸⁸ Mechling, *supra* note 39, at 479, 488. Applications can also provide additional functionality to assist with orientation and location. *See, e.g.* SOS QR, which provides an alert notification system for mobile devices, in addition to personal emergency records which can assist emergency personnel and others helping a lost individual. SOS QR, *Get Help and Be Safe in an Emergency*, <http://www.sos-qr.com/> (last visited Sept. 16, 2016).

¹⁸⁹ CTIA CVAA Report Comments at 26 (providing an overview of actions by the wireless industry to make products accessible to people with cognitive disabilities).

¹⁹⁰ Joanne Carney, *Campfires Around Which We Tell Our Stories: Confronting the Dilemmas of Teacher Portfolios and New Technologies*, <http://helenbarrett.com/campfires.htm> (last visited Sept. 19, 2016) (quoting Laurie Anderson).

¹⁹¹ DAC Best Practices at 1 (citing, as examples of such emerging technologies, “more intuitive user interface hardware and software features, sensor, [and] artificial intelligence”).

¹⁹² As Stewart Brand noted, “Once a new technology rolls over you, if you’re not part of the steamroller, you’re part of the road.” Stewart Brand, *The Media Lab: Inventing the Future at M.I.T.* 22 (1987).

This White Paper highlights a number of accessibility features, several of which provide ways to simplify functions and stay focused, to enable people with cognitive disabilities to use existing ICT.¹⁹³ In addition, some manufacturers are looking for ways to make new wireless devices and applications more accessible to and useful for users with cognitive disabilities.¹⁹⁴

So what's left to ensure an accessible technology future for this population? Below, we offer guidance to ensure that this outcome can be achieved as innovative information and communications technologies continue to evolve and play an ever-increasing role in our daily lives.

- *Universal Design.* Notwithstanding the accessibility achievements that have been made to date, there are still many communications technologies that are complicated to navigate and use, and which create barriers for individuals who have difficulty paying attention, remembering where certain features are, following prompts, paying attention when distractions appear, and understanding complex instructions. More needs to be done to incorporate accessible design into ICT products and services to address the needs of people with cognitive disabilities. These efforts need to be undertaken by manufacturers and developers as early as possible in their design and development processes, both to avoid costly and burdensome retrofits and to enable people with cognitive disabilities to benefit from new technologies at the same time they are rolled out to everyone else. Attaining this outcome will enhance user independence, integration, and productivity, while reducing stigmas that could be associated with reliance on specialized devices.
- *Consumer Outreach and Training.* Ensuring that people with cognitive disabilities can harness the transformative power of communications technologies will only happen if these individuals and their support networks know about these technologies and understand their power to dramatically improve their lives. This will only come about with comprehensive outreach that informs and educates these consumers and their caregivers about the requirements for and availability of accessible features on products and services.¹⁹⁵ At present, such outreach efforts appear to be lacking.¹⁹⁶ The consequence is that all too many ICT users with cognitive disabilities may be hesitant to try out new technologies, operating under the false perception that these are unworkable for them or not necessary for their daily routines. The dissemination of accurate information about the existence of and usability of accessible ICT options on these

¹⁹³ See *supra* Part VI.C.2-5; CTIA CVAA Report Comments at 5-22.

¹⁹⁴ CTIA CVAA Report Comments at 21 (pointing, among other things, to DyslexiaKey's assistance to individuals with dyslexia, SOS QR's emergency assistance app, UnusTactus' one-touch photo dialer and alert notifications and the Talkitt app, which translates unintelligible pronunciation into understandable speech).

¹⁹⁵ See *supra* Part V.A (discussing Commission regulatory requirements for accessible product and service information).

¹⁹⁶ Studies show a need for greater interaction between consumers with cognitive disabilities and device manufacturers, and a need for more training and technical support from the manufacturer or service provider. LoPresti, *supra* note 18, at 31-32.

devices can counter what appears to be this tendency. There are several strategies, described below, that can be used to enhance the quality and effectiveness of outreach to promote the use of ICT for this population:

→ Targeted Outreach. Outreach efforts should be targeted to people with cognitive disabilities, their families, support networks, and representative organizations about laws that guarantee a right to accessible communications technologies, products, and services in different settings. Such outreach should include as well resources that are available to assist users and their support networks in acquiring and using communications technologies. Those performing outreach should recognize the wide range of cognitive disabilities that exist, and that different consumers will have different abilities, different needs, and varying degrees of familiarity with technology. Just as with product design, when it comes to outreach, customization is key.

→ Databases of Accessible ICT. In order to make it easier for people with cognitive disabilities to locate ICT that can best suit their needs, it would be beneficial to have an accessible online database containing information about these products and services. Some options for achieving this include the Arc's Tech Toolbox,¹⁹⁷ Bridging Apps,¹⁹⁸ the Global Accessibility Reporting Initiative (GARI),¹⁹⁹ CTIA's Access Wireless website,²⁰⁰ and the Commission's Accessibility Clearinghouse.²⁰¹

→ Technology Literacy. As articulated above, there are practical barriers that may prevent people with cognitive disabilities from accessing ICT, such as cost and a lack of accessible equipment. However, even once they gain access, some individuals with cognitive disabilities may not be able to make full use of the communications and Internet-based services because of a lack of digital literacy. Accessible digital learning tools can begin to address this problem and enable people with cognitive disabilities to become better equipped to take advantage of many of the features, applications, and functionalities highlighted in this paper.

¹⁹⁷ See The Arc, Tech Toolbox™, <https://toolbox.thearc.org> (providing information on accessible technology products) (last visited Oct. 5, 2016).

¹⁹⁸ Bridging Apps provides a search tool that enables users to locate useful apps through functional needs categories. Bridging Apps, *Dashboard*, <https://search.bridgingapps.org/dashboard> (last visited Sept. 16, 2016).

¹⁹⁹ GARI is an online database for accessible mobile phones, tablets, and apps that allows consumers to find out information about the accessibility features on mobile devices. See Mobile Manufacturers Forum, *GARI*, <https://www.gari.info> (last visited Oct. 5, 2016).

²⁰⁰ See CTIA, AccessWireless.org, www.accesswireless.org (last visited Oct. 5, 2016).

²⁰¹ Pursuant to section 717(d) of the Act, 47 U.S.C. § 618(d), the Commission has established a clearinghouse of information on the availability of accessible products and services and accessibility solutions required under sections 255, 716, and 718 of the Communications Act. FCC, Accessibility Clearinghouse, <https://ach.fcc.gov/>.

The development of an online curriculum can be undertaken in conjunction with family, self-advocate and service-provider groups.²⁰²

➔ **Easy-to-Understand Instructions.** Consumers with cognitive disabilities need to be able to understand how to use a product after it is acquired. To this end, the DAC Best Practices recommend the following: “Where appropriate, ICT stakeholders should offer accessible instructions, user guides, customer support services, and other information in ways that may enable people with cognitive disabilities to independently, or with their caregivers or support staff, learn to operate and use ICT products and services.” Such efforts will go a long way to making innovative products useful to the individuals who acquire them.

- *Industry Education.* As discussed above,²⁰³ designing and developing technologies that meet the needs of people with cognitive disabilities will only be effective if the companies that build these technologies obtain input from these consumers and their support networks about what is needed to make their offerings accessible to this population. In addition to seeking out collaborative relationships with these individuals and including them in product research, testing and trials, the DAC Best Practices recommend that, where appropriate, ICT stakeholders look for opportunities to learn about these accessibility and usability issues by “following and participating in national research, learning about emerging standards and guidance from knowledgeable organizations (e.g., the World Wide Web Consortium), and “participating in online communities and other user communities comprised of users with cognitive disabilities and their caregivers.”²⁰⁴
- *Customer Service Employee Training.* Some of the resistance to acquiring new communications technologies can be mitigated if companies raise awareness among their own sector customer service representatives and retail sales personnel about the communication needs of people with cognitive disabilities, and the availability of solutions to meet these needs. Providing public-facing employees with such information can enable them to identify features and functions of their products and services that may be useful to this population, and can help break down incorrect perceptions that might be limiting their understanding of how their devices can meet the needs of this population. To this end, the DAC’s Best Practices recommend, where appropriate, that ICT stakeholders “make efforts to raise awareness among designers, developers, service personnel and customer representatives about the needs of people with cognitive disabilities and their support networks, including identifying features and functions of products and services that may be useful to people with cognitive disabilities.”²⁰⁵

In conclusion, the potential for accessible ICT to shape and vastly improve the lives of people with cognitive disabilities cannot be overstated. Ensuring the availability of

²⁰² See generally National Council on Disability, *supra* note 42, at 21-22.

²⁰³ See *supra* Part VI.A.

²⁰⁴ See DAC Best Practices at 2.

²⁰⁵ See *id.*

communications technologies needed to live more independently will empower this community to pursue their dreams. The Consumer and Governmental Affairs Bureau commits to working together with industry and the network of consumers, advocates and caregivers dedicated to this purpose on ways to ensure that individuals with cognitive disabilities have the communications tools they need in order to live more fulfilling lives and pursue their goals on their own terms, and with the dignity our laws afford all Americans.

Attachment

Disability Advisory Committee

Best Practices to Promote Effective Access to and Usability of ICT
Products and Services for Americans with Cognitive Disabilities

Best Practices to Promote Effective Access to and Usability of ICT Products and Services for Americans with Cognitive Disabilities

On October 28, 2015, the Federal Communications Commission (FCC) held a summit on the communications needs of people with cognitive disabilities¹ to learn more about how this population uses information and communication technology (ICT).² The FCC and participants, including Disability Advisory Committee (DAC) members, learned how ICT products and services have enabled millions of people with cognitive disabilities to more fully and independently participate and access educational, economic, civic, and personal interaction opportunities, while also learning about the accessibility and usability barriers that people with cognitive disabilities may continue to face. Participants also learned that people with cognitive disabilities have strong potential to consume mainstream technology products and services at higher rates than in the past, due to the decrease in cost of technology, the increase in availability of technology through public services (*e.g.*, IDEA provides technology to students with disabilities in schools), the increased prevalence of caregivers who can train people with cognitive disabilities to use mainstream technology, and the rapid emergence of technologies that are particularly useful to people with cognitive disabilities (*e.g.*, more intuitive user interface hardware and software features, sensors, artificial intelligence, etc.).

At the FCC summit, consumer stakeholders highlighted some of the challenges that people with cognitive disabilities may face when accessing and using ICT products and services, including challenges comprehending complex screen menus and guides, limited memory or recall skills to enter passwords or interact with security or navigation features, and loss of customized feature options when modifications are made to interfaces through software updates. Consumer stakeholders also highlighted the fact that users with cognitive disabilities often require customer support, onboarding experiences, user manuals and other information that is tailored to meet their user adoption needs. ICT stakeholders also described key personalization and customization features and capabilities that help to address these challenges, including innovative device unlocking capabilities (*e.g.*, fingerprint, facial, or optical recognition), pictures or images to reach specific contacts, screen readers, settings that enable a user, supporter or caregiver to control the complexity of user interfaces by selectively revealing or hiding features, and augmentative communication applications. Given the FCC's recent efforts in facilitating discussions about the needs of people with cognitive disabilities, participants generally understood that greater awareness among people with cognitive disabilities, caregivers, and industry stakeholders about these solutions may be necessary.

To increase awareness among ICT stakeholders, including manufacturers, service providers, and application developers, the FCC's DAC recognizes and recommends the

¹ A cognitive disability may generally limit a person's information processing, comprehension, or communication skills. For this reason, the term "cognitive disability" may refer to a wide-range of disabilities. A diverse range of features, services and functions can address the needs of people with cognitive disabilities to help facilitate independence and interactions.

² ICT includes telecommunications and advanced communications products and services, and applications or other services that may be helpful to people with cognitive disabilities.

following best practices to promote effective access to and usability of ICT products and services for Americans with cognitive disabilities (Best Practices).³

Inclusion & Awareness

- Where appropriate, ICT stakeholders should keep informed about the needs of and solutions for people with cognitive disabilities as communications technologies evolve in the 21st century by proactively seeking out and maintaining collaborative relationships with people with cognitive disabilities either individually or through organizations that have established expertise with or represent these individuals.
- Where appropriate, ICT stakeholders should seek opportunities to understand accessibility and usability issues for people with cognitive disabilities, which may include, for example, following and participating in national research, learning about emerging standards and guidance from knowledgeable organizations (e.g., the World Wide Web Consortium), participating in cognitive disabilities conferences, and participating in online communities and other user communities comprised of users with cognitive disabilities and their caregivers.
- Where appropriate, ICT stakeholders should include people with cognitive disabilities and their representatives in product and service design and development processes, as early as possible, to identify unmet user needs for features, products or services, and evaluate the accessibility and usability of solutions, features, and functions, including, for example, market research, product testing, demonstrations, or trials.

Personalization & Customization of Features and Functions

- In furtherance of the principles of universal design and to minimize the need for costly and difficult-to-find accessories, ICT stakeholders should, where appropriate, make efforts to incorporate features that allow for personalization and customization of features and functions that facilitate the accessibility and usability of ICT and applications for people with cognitive disabilities.

Instructions, Guides and Interactions

- Where appropriate, ICT stakeholders should offer accessible instructions, user guides, customer support services, and other information in ways that may enable people with cognitive disabilities to independently, or with their caregivers or support staff, learn to operate and use ICT products and services.
- Where appropriate, ICT stakeholders should make efforts to raise awareness among designers, developers, service personnel and customer representatives about the needs of

³ The FCC DAC believes these Best Practices are consistent with the declaration of principles in *The Rights of People with Cognitive Disabilities to Technology and Information Access*, developed by a consortium of consumers, national organizations and experts in cognitive disability through the Coleman Institute of the University of Colorado. Coleman Institute, *The Rights of People with Cognitive Disabilities to Technology and Information Access*, <http://www.colemaninstitute.org/declaration-text> (attached as Appendix).

people with cognitive disabilities and their support networks, including identifying features and functions of products and services that may be useful to people with cognitive disabilities.

The Rights of People with Cognitive Disabilities to Technology and Information Access

WHEREAS

- Twenty-eight million United States citizens have cognitive disabilities such as intellectual disability; severe, persistent mental illness; brain injury; stroke; and neurodegenerative disorders such as Alzheimer's disease;
- People with cognitive disabilities must have access to commercially available devices and software that incorporate principles of universal design such as flexibility and ease of use for all;
- People with cognitive disabilities are entitled to inclusion in our democratic society under federal laws such as the Americans with Disabilities Act (ADA), the Developmental Disabilities Assistance and Bill of Rights Act (DD Act), the Individuals with Disabilities Education Act (IDEA), Section 504 of the Rehabilitation Act, and under state and local laws;
- The disruptive convergence of computing and communication technologies has substantially altered how people acquire, utilize, and disseminate knowledge and information;
- Access to comprehensible information and usable communication technologies is necessary for all people in our society, particularly for people with cognitive disabilities, to promote self-determination and to engage meaningfully in major aspects of life such as education, health promotion, employment, recreation, and civic participation;
- The vast majority of people with cognitive disabilities have limited or no access to comprehensible information and usable communication technologies;
- Technology and information access by people with cognitive disabilities must be guided by standards and best-practices, such as personalization and compatibility across devices and platforms, and through the application of innovations including automated and predictive technologies;
- Security and privacy must be assured and managed to protect civil rights and personal dignity of people with cognitive disabilities;
- Enhanced public and private funding is urgently required to allow people with cognitive disabilities to utilize technology and access information as a natural consequence of their rights to inclusion in our society;
- Ensuring access to technology and information for the 28 million people with cognitive disabilities in the United States will create new markets and employment opportunities; decrease dependency on public services; reduce healthcare costs; and improve the independence, productivity, and quality of life of people with cognitive disabilities.

We hereby affirm our commitment to equal rights of people with cognitive disabilities to technology and information access and we call for implementation of these rights with deliberate speed.

View endorsers of this document and join us at: colemaninstitute.org/declaration
© 2013 Coleman Institute for Cognitive Disabilities