Technical Governance and Strategy

NSA ICT Fundamental Accessibility Requirements

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Contents

1. Purpose

This document will provide the necessary guidance and references to ensure accessibility is incorporated into the design, development, maintenance, and procurement of all National Security Agency information and communication technology (ICT).

The purpose of this document is to provide guidance to employees of the National Security Agency regarding the implementation of Section 508 of the Rehabilitation Act of 1973(29 U.S.C. § 794 (d)), as amended by the Workforce Investment Act of 1998 (P.L. 105-220, August 7, 1998), and the NSA ICT Accessibility Standards. The National Security Agency is committed to making all of its information and communication technology (ICT) accessible, especially to individuals with disabilities.

2. Background

In 1986, Congress added Section 508 to the Rehabilitation Act of 1973. Section 508 established non-binding guidelines for ICT accessibility. On August 7, 1998, the President signed into law the Workforce Investment Act of 1998, which included the amendments to the Rehabilitation Act. These amendments significantly expanded and strengthened the ICT accessibility requirements in Section 508 and made them binding on Federal agencies. Section 508, as amended, requires that when Federal agencies procure, develop, maintain, or use ICT, they ensure that Federal employees and members of the public with disabilities have access to and use of information and data that is comparable to the access to and use of the information and data that is available to individuals without disabilities. Section 508 was enacted to eliminate barriers in ICT, to make available new opportunities for people with disabilities, and to encourage development of technologies that achieve these goals.

The first regulation implementing Section 508 was issued by the Architectural and Transportation Barriers Compliance Board ("Access Board"), an independent Federal agency, whose primary mission is to promote accessibility for individuals with disabilities. This regulation is referred to as the Access Board's "ICT Accessibility Standards," which became enforceable on June 21, 2001. The Access Board's standards set forth a definition of ICT and the technical and functional provisions and performance criteria for compliance with Section 508. The Access Board's standards were incorporated into the Federal Acquisition Regulation (FAR) on April 25, 2001.

NSA has made a corporate decision, backed by the CIO and Agency Board of Directors, to proactively meet or exceed all requirements of Section 508. Absent the formal approval of a CIO waiver or exception, all new agency ICT is expected to meet the requirements of the Agency Accessibility Standards starting June 1st, 2017. In accordance with the exception process and asset prioritization scale, all existing ICT must achieve an evaluation score of 4.4 or higher no later than June 1st, 2018, and a score of 4.8 or higher no later than January 1st, 2019. Where the Agency Accessibility Standards are not directly applicable to a given ICT resource, that resource shall be measured against this document or the Agency Self-Contained Product Accessibility Requirements, and shall conform to the same compliance timeline.

3. ICT Accessibility Requirements

All ICT not applying for and receiving a CIO waiver or exception shall be accessible to each of the user communities listed below. ICT remediating to meet the NSA ICT Accessibility Standards or the Self Contained Product Standards will meet the criteria set forth in this document. ICT owners/vendors shall document and demonstrate how a user from each community will be able to interact with the ICT and accomplish all the required tasks the ICT manages or addresses.

If an ICT resource is unable to meet the interface requirements of one or more user community, the owner/vendor shall document how the functions of the ICT will be alternately available or accessible. Documentation will also be required describing the negative impact to the user, and the lost/limited functionality of the ICT due to the accessibility shortfalls.

Each of the following seven user communities should be addressed separately.

Visual Disabilities

Overview

There are an estimated 10 million blind and visually impaired people in the United States, 1.3 million of which are considered legally blind (American Foundation for the Blind, 2008a). Vision impairments result from conditions that range from the presence of some usable vision, low vision, to the absence of any vision, total blindness. Low vision is a term that describes a person with a vision impairment that cannot be improved by correction but has some usable vision remaining. Legal blindness is defined as 20/200 or less in the better eye with the best possible correction. Errors of refraction, diseases of the eye, and other vision-related conditions are usually the cause of vision loss. Each of these categories includes more specific disorders, which are described below (American Foundation for the Blind, 2008b).

Common Errors of Refraction

- Myopia (Nearsightedness): Close objects look clear while distant objects appear blurred.
- Hyperopia (Farsightedness): The ability to see objects clearly at a distance while close objects appear blurry.
- Astigmatism: Due to the irregular curvature of the cornea, vision is blurry for both near and far objects.
- Presbyopia: The eye lens becomes less elastic (associated with aging) and produces blurred vision when focusing on near objects.

Common Diseases of the Eye

- Cataracts: Clouding of the eye's lens that causes loss of vision.
- Glaucoma: Pressure inside the eye is elevated and can cause damage to the optic nerve, which results in damage to peripheral vision.
- Macular Degeneration: There is a disturbance of blood vessels in the eye resulting in progressive loss of central vision.
- Retinitis Pigmentosa: There is a degeneration of pigment in the eye that is needed to absorb light and create visual images, leading to "tunnel vision" and night blindness.
- Retinopathy (due to Diabetes): Retinopathy typically affects the blood circulation of the retina, which causes blotchy vision.

Color Vision Deficiency (Color Blindness) occurs when cone cells of the retina, which provide daylight and color vision, are affected and there is difficulty distinguishing among colors. Typically this only involves certain hues, for example a red–green deficiency; total color blindness (achromatic vision) is rare.

1. Blind (B) Users

Blind users typically navigate ICT using a keyboard, touchscreen or physical controls. They do not use a mouse or other free moving pointer device. Screen reading software such as JAWS or NVDA reads text content on the page and presents it as speech or braille.

2. Low Vision (LV) Users

Low vision users typically navigate ICT using a mouse or touchscreen though sometimes keyboard interaction makes navigation easier at higher magnification. LV Users modify the display by zooming in on the display using a magnifier such as Zoomtext or Magic or using system, application, or browser settings. They may also modify the color scheme to better support their vision or avoid damaging it.

3. Color Blind (CB) Users

Color blind users are not limited in how they navigate ICT but information conveyed by color alone may not be available to them. All instructions and information must include a secondary means of conveying information such as texture, contrast, location, icons, or text.

Auditory Disabilities

Overview

According to the National Institute on Deafness and Other Communication Disorders, approximately 15 percent (32.5 million) of American adults report some degree of hearing loss (NIDCD, 2008). Hearing loss is a decrease in ability to hear and can occur at birth, suddenly, or gradually over time. Depending on the cause, hearing loss can range from mild to severe and can be reversible, temporary, or permanent (WebMD, 2008). There are three types of hearing loss; conductive, sensorineural, and mixed.

Conductive hearing loss is associated with the bones of the ear, the eardrum, or the membranes that relay sound to the inner ear. Essentially, sound is not conducted through the ear and usually involves a reduction in sound level, or the ability to hear faint sounds. Conductive hearing loss may be caused by fluid build-up from a cold, allergies, ear infections, and benign tumors (ASHA, 2008).

Sensorineural loss is associated with the nerves that transmit messages from the inner ear to the brain. Sensorineural hearing loss involves a reduction in sound level, ability to hear faint sounds, and also affects ability to clearly hear and understand speech. Sensorineural hearing loss can be caused by noise exposure, head trauma, viruses, tumors, birth injury, drugs that are toxic to the auditory system, and genetic syndromes (ASHA, 2008).

Mixed hearing loss is characterized by a combination of both conductive and sensorineural hearing loss, where there is damage in the outer or middle ear as well as in the inner ear or auditory nerve (ASHA, 2008).

Conductive hearing loss can often be medically or surgically corrected. However, sensorineural hearing loss is a permanent loss that cannot be corrected. Some individuals can benefit from hearing aids and

assistive devices that improve hearing and listening abilities. However, in some cases, a hearing aid may not enable an individual to discriminate environmental sounds or clearly understand speech.

The degree of hearing loss is determined by measuring hearing threshold. Hearing threshold refers to the levels in decibels (dB) at which a signal is just barely heard. A mild hearing loss is characterized as loss at 26-40 dB. Mild hearing loss may result in difficulty hearing soft voices, speakers at a distance, or understanding conversation in noisy environments. A moderate hearing loss is characterized as loss at 41-55 dB and moderate to severe at 56-70 dB. In this range, conversation even in quiet environments can be difficult and speech may need to be loud. A severe hearing loss is characterized as loss at 71-90 dB. At this level, hearing is difficult in all situations. An individual with profound hearing loss, loss at 91+ dB, may not hear even loud speech or sounds. In this instance, hearing would not be used as a primary method for processing information and communicating (House Ear Institute, 2008).

4. Deaf and Hard of Hearing (DHH) Users

Deaf and hard of hear users are not limited in how they navigate ICT but they rely on visual information rather than auditory information. Captions for multimedia and audio-only content as well as visual alerts are needed.

Ambulatory Disabilities

Overview

Multiple disabilities fall under this category which includes anything that would affect gross or fine motor controls. Paralysis, amputations and birth defects may lead to limited or inability to use one or both hands. An estimated 5.6 million Americans live with paralysis (Christopher and Dana Reeve foundation, 2009) and an estimated 2 million Americans live with amputations. This category also may also individuals with muscular dystrophy, arthritis, and fibromyalgia as well as other conditions which limit an individual's ability to grip, apply force, or use fine motor control. An estimated 50 million adults in the United States have some form of arthritis, and one in five adults report having a diagnosis of arthritis (Centers for Disease Control and Prevention, 2010). By 2030, an estimated 67 million Americans ages 18 years or older are projected to have arthritis, and 25.9% of women and 18.3% men report a diagnosis of arthritis (Centers for Disease Control and Prevention, 2010). The exact prevalence of fibromyalgia in the U.S. population is as high as 5 million Americans ages 18 and older, with about 80-90% being women (Office of Women's Health, U.S. Department of Health and Human Services, 2012). Temporary disabilities such as a broken wrist or leg also fall in this grouping.

5. Limited Mobility (LM) Users

Limited mobility users typically navigate using a device that relies on the keyboard focus. A wide range of assistive technology to support LM users exist such as joysticks, mouth sticks, and voice controls but most rely on the keyboard focus to navigate rather than a free flowing pointer.

Cognitive or Learning Disabled (CLD) Users

According to the American Association on Intellectual and Developmental Disabilities, an intellectual (cognitive) disability is a disability that involves significant limitations both in intellectual functioning and in adaptive behavior. Adaptive behaviors include many everyday social and practical skills such as interpersonal and communication skills, social problem solving and responsibility, the use of time and money, as well as daily personal care and safety. Limitations in individuals often coexist with strengths, and will vary from individual to individual. This disability originates before the age of 18 and

encompasses a wide range of conditions, types, and levels. Intellectual disability is caused by factors that can be physical, genetic, and/or social.

According to the President's Committee for People with Intellectual Disabilities, an estimated seven to eight million Americans of all ages experience intellectual disability. Intellectual disabilities affect about one in ten families in the United States.

Intellectual or cognitive impairments can start any time before a child reaches the age of 18 years. Persons who have intellectual disabilities may have other impairments as well. Examples of coexisting conditions may include: cerebral palsy, seizure disorders, vision impairment, hearing loss, and attention-deficit/hyperactivity disorder (ADHD). Persons with severe intellectual disabilities are more likely to have additional limitations than persons with milder intellectual disabilities (EEOC, 2011).

Developmental disabilities that may also include an intellectual disability are briefly described below. Intellectual disabilities can also be caused by a head injury, stroke or illness. For some no cause is found. Intellectual disabilities will vary in degree and effect from person to person, just as individual capabilities vary considerably among people who do not have an intellectual disability. People should not make generalizations about the needs of persons with intellectual disabilities. In some instances an intellectual disability will not be obvious from a person's appearance, nor will it be accompanied by a physical disability. Persons with intellectual disabilities successfully perform a wide range of jobs, and can be dependable workers. (EEOC, 2011)

- Autism: Individuals with disabilities on the autism spectrum may have complex developmental disabilities that typically appear during the first three years of life. These disabilities are the result of a neurological disorder that affects the normal functioning of the brain, impacting development in the areas of social interaction and communication skills. Both children and adults with disabilities on the autism spectrum typically show difficulties in verbal and non-verbal communication, social interactions, and play or leisure activities.
- Cerebral Palsy is a condition, sometimes thought of as a group of disorders, that can involve brain and nervous system functions such as movement, learning, hearing, seeing, and thinking. Cerebral palsy is caused by injuries or abnormalities of the brain. Most of these problems occur as the baby grows in the womb, but they can happen at any time during the first two years of life, while the baby's brain is still developing.
- Down Syndrome is a genetic disorder that causes lifelong intellectual disabilities, developmental delays and other complications. Down syndrome varies in severity, so developmental problems range from moderate to serious. Down syndrome is the most common genetic cause of severe intellectual disabilities in children. Individuals with Down syndrome have a higher incidence of heart defects, leukemia, sleep apnea, and dementia later in life.
- Fetal Alcohol Syndrome is a condition that results from prenatal alcohol exposure. It is a cluster of mental and physical birth defects that include intellectual disabilities, growth deficits, central nervous system dysfunction, craniofacial abnormalities and behavioral instabilities. Fetal Alcohol Effect is a less severe set of the same symptoms. It is the only form of intellectual disability that can be totally prevented and eradicated.
- Fragile X Syndrome is a hereditary condition that can cause learning problems ranging from subtle learning disabilities and a normal IQ, to severe intellectual disabilities and autism.

Individuals with Fragile X Syndrome may also have physical and behavioral disorders, and speech and language delays.

- Prader-Willi Syndrome (PWS) is the most common known genetic cause of life-threatening obesity in children. PWS typically causes low muscle tone, short stature if not treated with growth hormone, and a chronic feeling of hunger that, coupled with a metabolism that utilizes drastically fewer calories than normal, can lead to excessive eating and life-threatening obesity. PWS is also characterized by motor development delays along with some behavior problems and unique medical issues. Intellectual deficits can be present to varying degrees, but even higher functioning individuals will have learning difficulties.

Learning Disabilities (LD) refer to a number of disorders which may affect the acquisition, organization, retention, understanding or use of verbal or nonverbal information. These disorders affect learning in individuals who otherwise demonstrate at least average abilities essential for thinking and/or reasoning.

Learning disabilities result from impairments in one or more processes related to perceiving, thinking, remembering or learning. Learning disabilities range in severity and may interfere with the acquisition and use of oral language, reading, written language, and mathematics. Learning disabilities may also involve difficulties with organizational skills, social perception, social interaction and perspective taking. (Learning Disabilities Association of Canada, 2015)

Although learning disabilities occur in very young children, the disorders are usually not recognized until the child reaches school age. Learning disabilities are a lifelong condition; they are not outgrown or cured, though many people develop coping techniques through special education, tutoring, medication, therapy, personal development, or adaptation of learning skills. Approximately 4.6 million adults in the United States have learning disabilities (National Center for Learning Disabilities, 2014).

Learning disabilities can be divided into three broad categories with more specific disorders included in each (NCLD, 2015). The specific disorders are described below.

Specific Learning Disability: A disorder in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, write, spell or to do mathematical calculations. Included in this category are expressive writing and expressive language disorders.

- **Dyslexia** is the term associated with specific learning disabilities in reading. Although features of a learning disability in reading vary from person to person, common characteristics include the difficulty with individual sounds in words, and difficulties with word decoding, fluency, rate of reading, rhyming, spelling, vocabulary, comprehension and written expression. Dyslexia is the most prevalent and well-recognized of the subtypes of specific learning disabilities.
- **Dyscalculia** is the term associated with specific learning disabilities in math. Although features of a learning disability in math vary from person to person, common characteristics include difficulty with counting, learning number facts and doing math calculations, difficulty with measurement, telling time, counting money, estimating number quantities, mental math and problem-solving strategies.
- **Dysgraphia** is the term associated with specific learning disabilities in writing. This term is used to capture both the physical act of writing and the quality of written expression. Dysgraphia can

manifest in difficulties with spelling, putting thoughts on paper, and poor handwriting, including difficulty in forming letters or writing within a defined space, organizing thoughts on paper, keeping track of thoughts already written down, and difficulty with syntax, structure, and grammar.

While not designated as specific subtypes of learning disabilities, there are a number of areas of information processing that are commonly associated with LD (NCLD, 2014).

- **Auditory Processing Disorder** is the term used to describe a weakness in the ability to understand and use auditory information. Individuals may have difficulties with noticing, comparing and distinguishing the distinct and separate sounds in words, picking out important sounds from a noisy background, recalling information presented orally, understanding and recalling the order of sounds and words, and difficulty with spelling, reading and written expression.
- **Visual Processing Disorder** is the term used to describe a weakness in the ability to understand and use visual information. Individuals often have difficulty noticing and comparing features of different items and distinguishing one item from another, distinguishing a shape or printed character from its background, distinguishing the order of symbols, words or images, difficulty engaging in short-term and long-term recall of visual information, and understanding how objects are positioned in space.
- **Non-Verbal Learning Disabilities** is the term used to describe the characteristics of individuals who have unique learning and behavioral profiles that may overlap with dyslexia, dyscalculia and dysgraphia but that differ in significant ways. Most notably, these individuals often have strengths in the areas of verbal expression, vocabulary, reading, comprehension, auditory memory and attention to detail, yet have difficulty with math computation and problem solving, visual-spatial tasks and motor coordination, reading body language and social cues, as well as seeing the "big picture" in social and academic contexts
- **Executive Functioning Deficits** is the term used to describe weaknesses in the ability to plan, organize, strategize, remember details and manage time and space efficiently. Executive functioning deficits are often seen in individuals who have a learning disability.

6. Cognitive & Learning Disabled (CLD) Users

Cognitive and learning disabled users are not limited in how they navigate ICT but decisions about design and content presentation can affect their ability to function. Consistent, simple design along with careful use of redundant cueing (for example an icon and text together) help with learning. Text-to-Voice programs read text content to support users with visual processing disorder while captioning and visual cues support user with auditory processing disorder. Some users are unable to focus on content when scrolling, animated, or content that continually changes in a dynamic manner is visible. This applies to items such as, interactive carousels, scrolling tickers, and animated images, etc. A method for the user to pause, disable, or hide these components as well as access any content in a static manner is needed.

Seizures

Epilepsy is a chronic, neurological condition characterized by recurrent seizures. A seizure happens when abnormal electrical activity in the brain causes an involuntary change in body movement or function, sensation, awareness, or behavior (CDC, 2011). Seizures can vary from a momentary disruption

of the senses to short periods of unconsciousness or staring spells to convulsions, and some people have only one type of seizure, while others have more than one type (CDC, 2011). The term epilepsy can be used interchangeably with the term seizure disorder; epilepsy is a chronic condition and cannot be transmitted from person to person (CDC, 2011). Having a seizure does not necessarily mean that a person has epilepsy. Only when a person has experienced two or more seizures is s/he considered to have epilepsy (NINDS, 2011). Epilepsy affects about 2.3 million people in the United States, with approximately 150,000 new cases reported each year (CDC, 2013).

Epilepsy has many possible causes. Anything that disturbs the normal pattern of neuron activity -- from illness to brain damage to abnormal brain development -- can lead to seizures (NINDS, 2011). In some cases, the brain's attempts to repair itself after a head injury, stroke, or other problem may inadvertently generate abnormal nerve connections that lead to epilepsy (NINDS, 2011). Abnormalities in brain wiring that occur during brain development also may disturb neuronal activity and lead to epilepsy (NINDS, 2011). About half of all seizures have no known cause. However, in other cases, the seizures are clearly linked to infection, trauma, genetic influence, developmental disabilities, dementia, or other identifiable factors (Mayo Clinic, 2011).

7. Seizure Prone (SP) Users

Seizure Prone users are not limited in how they navigate ICT but flashing content, content that switches rapidly between light and dark contrast, should be avoided. This applies to videos with dramatic changes between dark and light backgrounds as well as flashing content on otherwise static pages. Because even small areas can be magnified by seizure prone users who also are low vision users, avoiding flashing altogether is the best approach.

4. Specific ICT Standards Documents

NSA ICT Accessibility Standards

This document captures the accessibility requirements for all software, website, and application development, maintenance, and procurement. When evaluating the procurement of vendor training, it shall be used in conjunction with the NSA Fundamental Accessibility Requirements document to ensure all aspects of compliance are met.

This document shall also be utilized to evaluate existing ICT.

NSA ICT Self-Contained Product (SCP) Standards

This document captures the accessibility requirements for all self-contained, closed products, and shall be utilized in conjunction with the NSA Fundamental Accessibility Requirements document to ensure all aspects of compliance are met. Types of SCP include, but are not limited to: information kiosks, ATMs, fare machines, point of sale customer card payment systems, electronic building directories, information transaction machines, copiers, printers, calculators, fax machines, and similar products.

This document shall also be utilized to evaluate existing ICT.

5. Supporting Documents and Guidelines

NSA/CSS Workforce Accessibility Policy

This document captures the Agency requirement to meet the criteria set forth in all Accessibility documents, guidelines, and standards.

NSA ICT Accessibility Acquisition Guidance

This document shall be used to ensure proper language is included in all NSA ICT procurement. Appropriate language and references are supplied, along with best practices and proper pre-acceptance evaluation guidance.

NSA ICT Accessibility Exception Decision Tree

This document demonstrates the appropriate thresholds for exception to the NSA Workforce Accessibility Policy, and also captures evaluation and remediation workflow.