ICT Accessibility

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Nirmita Narasimhan

Agenda

- Objective
- Introduction
- What is Accessibility?
- International Frameworks
- Accessibility
  - Assistive Technology
  - Web Accessibility
  - Mobile Accessibility Features and Services
- Accessibility Policy

Objective

- To provide an overview of ICT Accessibility

Introduction

- Over a billion people in the World living with a disability according to the World Disability report
- Over 90% of persons with disabilities live in developing countries and have little or in many cases, no access to basic human rights of education, food and shelter, employment, independent living and access to information
- In India alone, as per the 2001 Census, there are around 2.19 crore people with disabilities, constituting 2.13% of the total population of the country
- Developments in ICT make access to ICT possible and deployable for persons with disabilities

What is Accessibility?



- **"Accessibility** is the degree to which a product, device, service, or environment is available to as many people as possible"
- Physical and ICT accessibility
- ICT accessibility- hardware, software, websites and content
- Universal Design- design of a product to be usable by all without adaptation
- Reasonable Accommodation- necessary and appropriate modifications without undue hardship to enable equal access by persons with disabilities
- Assistive Technology- refers to technologies enabling access to ICT

Accessibility Standards

- WCAG 2.0- Web Content Accessibility Guidelines
  - Perceivable, Operable, Understandable, Robust
- Mobile accessibility guidelines
- DAISY
- Unicode
- ITU standards in Telecommunications Accessibility

International Frameworks

- UN Convention on the Rights of Persons with Disabilities (UNCRPD) – comprehensive human rights treaty that recognises the rights of persons with disabilities to non-discrimination and equality
- Specifically mentions ICT accessibility in various articles such as
  - Art 4 (g)- obligation to undertake and promote R&D and deploy accessible ICTs, aids and assistive technologies at affordable cost
  - Art 4(h)- disseminate information to persons with disabilities about accessible ICTs, Assistive technologies, aids and other disability related resources
  - Art 5- recommends reasonable accommodation
  - Art 9- explicitly deals with accessibility of physical environment, transportation, information and ICTs
  - Art 27- promotes inclusive environment and reasonable accommodation in the workplace.
  - Art 21- promotes freedom of expression and opinion and access to information through use of assistive technologies and alternative forms of communication such as Braille and sign language
- Biwako Millenium framework promotes policy in the countries in the Asia Pacific region to foster inclusive, rights based and barrier free societies for persons with disabilities

ASSISTIVE TECHNOLOGY

Assistive technology : some historical facts

- **1808** – The first typewriter is built by Pellegrino Turri to help a blind friend write legibly.
- **1886** – Herman Hollerith, who had a cognitive processing disability, implemented the idea of using punch cards to transport data from the 1890 census. He later founded the Tabulating Machine Company. In 1924, it became known as IBM.
- **1948** – John Bardeen, William Shockley and Walter Brattain at Bell Labs invented the transistor to create more reliable, smaller, cheaper, more efficient hearing aids. They won the 1956 Nobel Prize for Physics.
- **1964** – A deaf orthodontist sent a teletype machine to a deaf scientist, beginning the TTY (Teletypewriter) revolution.
- **1972** – Vinton Cerf, who had a hearing impairment and was married to a deaf woman, developed host level protocols for ARPANET. He communicated with his wife through the computer using text – the precursor to e-mail.



Hollerith Tabulating machine and sorter

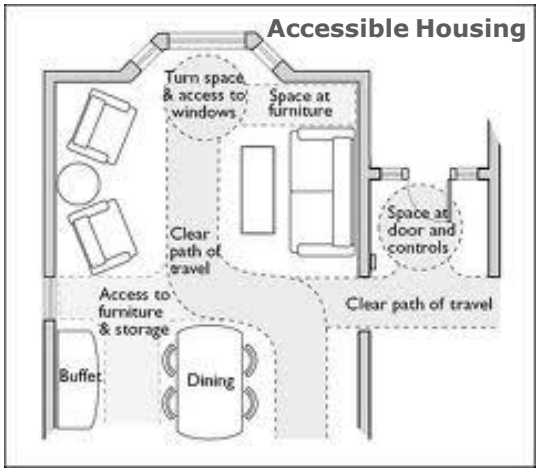


Teleprinter

Examples of Physical Accessibility

- Housing – ramps, lifts, zero step entries, wide – wheelchair accessible doors

- Transportation – low floor vehicles, ramp for wheelchairs



Source: http://www.cmhc-schl.gc.ca/



Source: samarthyam.org

Examples of Assistive Technology

- Communication impairment –e.g. Electronic speech synthesizer
  - Physicist Stephen Hawking uses special mobility devices such as speech synthesizers

- Mobility impairment: Voice operated wheelchair, Page-turning device; Adaptive keyboards and computer mice (pointing devices such as trackballs, vertical mouse, foot mouse, or programmable pedal)

Electronic speech synthesizer



Voice operated Wheelchair



Source: Global accessiblity news

Examples of Assistive Technology

- Hearing impairment - earphones, headphones, headsets; hearing aid; Real-time closed captioning; Teletypewriter

- Physical or mental impairment, learning disability: Voice recognition software



Source: Howstuffworks

Voice Recognition software



Source: Howstuffworks

Examples of Assistive Technology

- Perceptual disability, learning disability: Talking textbooks

- Visual impairment, learning disability: Modified monitor interface, magnification devices; Reading service, E-text, Braille note-taker; Braille printer; screen magnifiers; Optical scanner

Daisy Digital Talking book



Source: Wikipedia



Source: cornell.edu

WEB ACCESSIBILITY

What is Web Accessibility?

- Web accessibility means that all persons irrespective of age, disability or any other factor are able to perceive, navigate, communicate and interact with the web

- While modern technologies facilitate access to the web, it is the ease of navigability which makes using the web a more fruitful, efficient and pleasurable experience

- Depending on the nature of disability, different features can be provided to make websites accessible

Web Accessibility Considerations

- **Blind Users –**
  - Need to use a screen reader to read the contents of the screen.
  - Some cases where screen readers won't be able to read the content include - If any content is presented in a purely visual or graphical form or if images don't have alternative text, exclusively mouse based navigation without keyboard alternatives, data is an a tabular form without correct mark-up etc.
- **Partial Sight –** For persons with low vision – websites should provide the ability to enlarge the text on the web-page; For colour blind persons, colour contrasts or sole reliance on colours to convey meanings would be a problem
- **Epileptic persons** - there shouldn't be any flickering or flashing content;
- **Persons with motor disabilities** - There should be keyboard accessibility using keys like Tab, Enter etc.

Web Accessibility Considerations

- **Hearing Impaired** –
  - For hearing impaired persons, audio files would be a problem. Hence it would be important to bring it to their notice that there is audio content present and then also to make a keyboard alternative for that
  - Provide synchronised captions for audio content, use transcripts and photos etc
- **Persons with cognitive impairments** – Need navigational controls to be provided
- **Persons who cannot use their hands –** Using keyboard and mouse both would be a problem, so we would need an option to have a voice based navigation system
- **Others:** Other problems include - for reading disabled, text only would be a problem and images would be more important to convey meaning, for mentally challenged persons, complicated procedural requirements would make comprehension and navigation difficult etc.

Web Content Accessibility Guidelines (WCAG)

- Laid down by the W3C to check accessibility of web pages
- Accessibility legislations around the world are based on WCAG
- 3 priority levels - A, AA and AAA in the order of importance in WCAG 2.0; Each priority level is characterised by a set of checkpoints.
- Examples of accessible features:
- Giving text alternatives for images, graphics, sounds etc; ensuring that all information which is available is also available without colour, ensuring documents can be read without style sheets, using mark up rather than images to convey information wherever possible; Creating documents that validate to published formal grammars etc

Example: Missing Alt-text for the banner image of mededu.up.nic.in

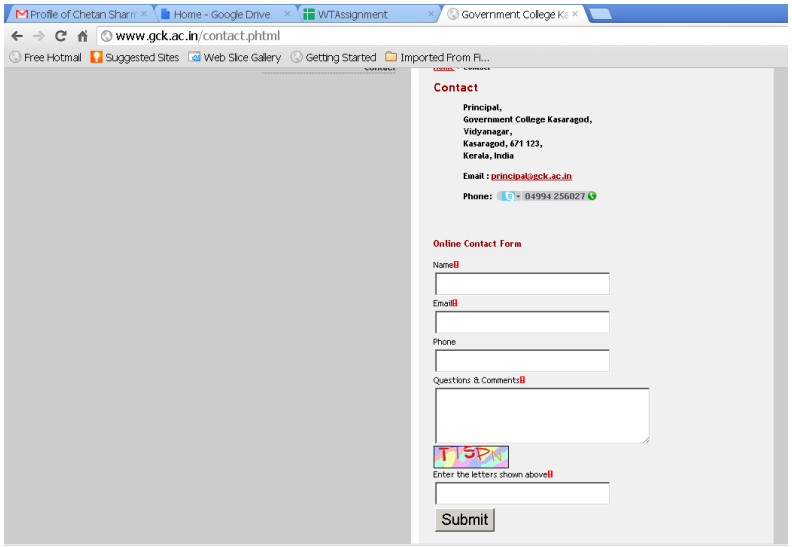


Inaccessible website examples

Example: *Accessibility issue : Multiple languages on one page*



Example: *Accessibility issue : Inaccessible captcha in a form*



MOBILE ACCESSIBILITY

Mobile Accessibility Features

- Examples of accessibility features by type of impairment they address
- Hearing
  - Visual alerts to notify the user of incoming calls/messages
  - Adjustable volume control
  - Call logs to display missed, received or dialed calls
  - Visual or tactile indicators showing what has been pressed on the keypad, and visual display of text
  - Text based messaging options
  - One on one video for sign language communications

Mobile Accessibility Features

- Vision
  - Tactile markers to help orient fingers on the keypad
  - Audible/tactile feedback to confirm button being pressed
  - Audible cues for low battery, caller waiting or ending a call and volume level
  - Display - larger size with back lighting, adjustable font sizes and adjustable brightness/contrast controls
  - Scanner and OCR and Text to Speech
- Speech
  - Alternatives to speech such as Text Messaging/SMS , Email, Instant Messaging ,Multi-media Messaging
  - Predictive Text
  - Video one on one for sign language

Example: Raku Raku mobile phone



Large screen & large letters

Adoption of a large 2.8-inch large LCD

Large display of letters

3 one-touch dial buttons

Calls can be made using just by one button

Voice reading function

Content of mail can be read aloud

Source: NTT DoCoMo presentation at ITU – UNESCAP meeting in Bangkok, August 26, 2009

Mobile Accessibility Features

- Dexterity
  - Ability to use the phone in 'hands-free' mode
  - Any key call answer
  - Voice recognition for dialing or accessing phone features
  - Phone designed to avoid extra movements e.g. a candy bar design to avoid sliding movements, flat back on the phone to allow for operation on a table top
  - Optional accessories such as a Bluetooth headset or keyboard making texting and talking much easier
- Cognition
  - Simple, easy to understand menus and instructions
  - Providing enough time for people to enter the required information, keys providing audio, visual and tactile feedback
  - Ability to associate photos with telephone numbers

Mobile Accessibility Features

- Illiteracy
  - Icon Menus
  - Audible or tactile feedback to confirm a button has been pressed
  - Call answered by pressing any key
  - Ability to associate photos with telephone numbers
  - Keypad shortcuts to make every step quick and efficient
  - Voice recognition for dialing or accessing features within the phone
  - SMS to Avatar translation for deaf illiterate (Tunisia)

Mobile Accessibility Services

- Digital Libraries
  - Bibulio-net in Japan (distributed by NTT-DoCoMo) Access to a huge network of talking books with an integrated DAISY player

- Relay Services
  - human operated services for media and mode translation during phone conversations, typically community supported
  - Important for accessible telephone services
  - 4 types – Video, text, speech-to-speech, captioned speech
  - Integration has several prerequisites such as relay services working wih commonly available handsets, users should have the choice to invoke relay services when calling/receiving calls

Mobile Accessibility Services

- IM relay
  - IM Relay is a text-based solution for individuals who are deaf, hard-of-hearing, or have speech loss; offered by AT&T
  - To relay with one-step dialing, users send the phone number they are calling via instant message to a screen name "ATTRelay." An AT&T Relay operator calls the phone number and translates the text to voice to the other party. There is no charge to use this service, but users must register.
  - Can be used on PCs as well as many mobile devices

- Server based voice dial and voice info
  - assist customers with limited ability to dial a number with a keypad
  - allows the user to maintain an address book and by pressing #8 to either ask to dial any number, or to call someone in their address book by saying their name.
  - Voice Info gives access to a number of practical information from weather forecast to travel info or general news.

Mobile Accessibility Services

- Path Finding - iWalk (AT&T)
  - Walking Directions for People with Low Vision or Blindness who cannot use navigation tools that rely on visual landmarks, iWalk is a navigation service that provides directions and feedback verbally.

- Emergency Phone services
  - Telecom regulatory authority needs to set standards for emergency services to be implemented by operators and public services which will allow persons with disabilities to
    - call emergency services, use a common regional emergency number and have an efficient emergency call that rapidly results in suitable action
    - use the same conversational terminal for the emergency call that they use for everyday calls and communicate in the modes and media they use in everyday calls.
    - get relay services included in the call if wanted/required

Mobile Accessibility Services

- Customer Services
  - Some companies whose customer services take into account the needs of persons with disabilities include NTT DoCoMo, Orange and AT&T
  - AT&T –
    - has a National Center for Customers with Disabilities where all customer services representatives are specially trained to understand the specific needs of customers with disabilities
    - Uses specialized wireless assistance (through direct voice, TTY, and e-mail) to help customers with disabilities who have accessibility and usability questions
    - Representatives are also given special training on hearing aids, TALKS phone, voice dialing, and TTY
    - Interfaces with the communication medium of choice of customers with disabilities. It may be a live text exchange, a mini-video relay call or a TTY call. All 34 customer service representatives have been trained to handle any and all of those situations.

Mobile Accessibility Services

- Example of easy to use mobile phone - NTT Docomo's "Raku-Raku" mobile phone has many accessible and assistive features and services
  - A large screen with large characters
  - Dedicated buttons to call certain pre-recorded numbers automatically
  - "Read aloud" menus and text
  - Voice input text messages and email
  - Access to a network of talking books (Bibulio-net, 12,395 titles as of March 2009) with an integrated DAISY player

Example: NTT Docomo Mobile Accessibility Services

DOCOMO's Hearty Plaza

docomo



We exchanged opinions with people with disabilities and universal design authorities from the stage of design and construction and developed enriched service menus and outlet design planning.

Interior, DOCOMO Shop Marunouchi in Yuraku-Cho, Chiyoda-Ku, Tokyo

Full services menu



Sign language staff



Concierge service

Consultation

English tool, brail tool

Shop design

Resolved levels on floors/corridor

Set up indoor directions

Set up omni-counter



Set up omni-toilet

Directions by artificial voice guide

「"DOCOMO Hearty Plaza" won a 2004 Good Design Award

Source: NTT DoCoMo presentation at ITU – UNESCAP meeting in Bangkok, August 26, 2009

ACCESSIBILITY POLICY

Accessibility Policy: Best Practices

- Countries around the world have adopted different approaches to disability rights and accessibility:
  - In the form of a general mandate to ensure equality and non discrimination e.g. Australia, New Zealand, Italy, Canada
  - or through specific provisions which promote ICT accessibility e.g. USA, Germany, Korea
  - Some countries (e.g.New Zealand, Italy, Korea) only cover web accessibility while others cover electronic accessibility (e.g. Germany)
  - In some countries like Canada accessibility provisions only apply to public entities whereas others like the UK have made accessibility provisions apply to both private and public entities
- USA and UK have made separate provisions for ICT as well as telecommunications accessibility

Resources

- ITU-G3ict e-accessibility toolkit
  - http://www.e-accessibilitytoolkit.org/
- http://webaim.org
- http://www.w3.org/standards/webdesign/accessibility

THANK YOU!