International Journal of Multidisciplinary
Research in Science, Engineering and Technology

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Impact Factor: 8.206

Volume 8, Issue 5, May 2025

Designing Accessible Web Interfaces for Aging and Vulnerable Populations

Vladyslav Malanin

V.M. Glushkov Institute of Cybernetics of the NAS of Ukraine, Kyiv

ABSTRACT: Ensuring aging and vulnerable people can use the web on their own is as much a legal obligation as it is a matter of justice. Such groups often struggle when using digital services due to problems related to their bodies, thinking skills or finances. The author identifies the needs of such user groups and matches them to well-known accessibility standards. Design, assistive technologies and practical examples from actual websites are all integrated in this book to explain practices for inclusive web design. By exploring frameworks, support tools and challenges in deployment, this study gives useful suggestions to developers and regulators for building inclusive digital environments. The results demonstrate that making accessibility a priority right from the start helps improve usability, supports following accessibility guidelines and encourages inclusion for all.

KEYWORDS: Web Accessibility, Inclusive Design, Aging Population, Vulnerable Users, WCAG, Assistive Technologies, Human-Centered Design, Digital Inclusion, Accessible Web Interfaces, Universal Design

1. INTRODUCTION

In the current era, the chance to use online resources and services is important for being included in society and for taking part in civic life. Now that so many operations, including those by governments, healthcare groups, banks and support services, have moved online, simple and accessible web interfaces are a crucial concern. Making websites usable for everyone, regardless of their abilities or disabilities, is what web accessibility is about. It is the most difficult for aging people and other groups who have any form of physical, sensory, cognitive or socio-economic disadvantage to access services online. There are difficulties for some users when websites have common standard layouts, poor contrast, tiny fonts, time-related actions or are not supported by assistive devices. According to worldwide population statistics, the number of adults over age 65 will rise sharply in the coming years, with the United Nations estimating one in six people worldwide will be older than that in 2050 (United Nations, 2019). Because more people are older and we depend on digital tools more, web designers can no longer approach accessibility passively.

Instead of trying to solve these problems themselves, organizations and designers are more frequently using established frameworks such as the Web Content Accessibility Guidelines (WCAG). WCAG is a worldwide standard for helping web content be accessible to people with various disabilities, including age-related disabilities (W3C, 2018). Even so, for these rules to function well, developers need to understand both the technical aspects and the everyday lives of users from various groups. It investigates the important guidelines, tools and practices that support making the web accessible to older and vulnerable people. It uses research from various fields, reviews real-world cases and relies on today's rules to offer an effective guide for developing and designing places online that support everyone.

- **Problems Encountered by Aging and Vulnerable Communities**

Seniors and people with certain needs often meet many difficulties when interacting online. The main causes of these challenges are sensory, motor, cognitive or social factors that make it hard for them to use web features properly. Many older adults and users with certain disabilities have presbyopia, reduced contrast sensitivity or color blindness, so it can be hard for them to read tiny text or figures in graphic designs (Czaja & Lee, 2007). Someone with hearing impairments may not be able to follow audio content such as instructional videos or alerts, if captions or transcripts are not supplied.

Using a mouse or keyboard can be tough for users with motor problems like tremors, arthritis or little control over their hands (Newell & Gregor, 2000). On the other hand, when users deal with memory loss, slow processing or maintaining attention, it might become difficult for them to comprehend site instructions, navigation or unfamiliar vocabulary

(Kurniawan, 2008). Some vulnerable groups might not be able to use technology well, get the tools they need or meet the costs which makes the problem worse. Because of these complexity issues, web designers should make their interfaces more understanding, open to change and versatile.

The following table covers the popular issues encountered by these user groups and the relevant design skills needed to address them:

Table 1: Accessibility Challenges Among Aging and Vulnerable Populations

Category	Challenges	Design Considerations
Visual	Difficulty reading small fonts, low contrast, or non-scalable elements	Use large, high-contrast text; support zooming and screen readers
Auditory	Inability to hear audio cues or voice content	Provide captions, transcripts, and visual indicators
Motor	Difficulty using mouse, clicking small targets, or sustained interaction	Enable keyboard navigation, large clickable areas, adjustable timing
Cognitive	Trouble understanding complex layouts or remembering tasks	Simplify navigation, provide clear instructions, use consistent layout
Socio-economic	Limited access to technology or internet	Ensure lightweight design, offline functionality, mobile compatibility
Digital Literacy	Difficulty understanding terminology or interface conventions	Use plain language, onboarding tutorials, and familiar icons

- **Key Motivations for Following Inclusive Design and WCAG**

Inclusive design tries to address the widest range of human abilities, ages and backgrounds before the design begins. Accessible design is about giving users with disabilities the tools they need by offering retrofitted solutions, but inclusive design aims to include everyone by designing adaptable systems that can work for all kinds of people (Clarkson et al., 2013).

The reason for including inclusive design is based on ethics and practical usage. The field supports universal human rights and makes certain that people are treated equally in digital environments. In practical terms, including all users in design helps everyone, cuts support expenses, makes users happier and increases how widely a product can be used (Persson et al., 2015). When poor design affects online healthcare, government or banking services—used mostly by aging and vulnerable people—it can greatly reduce their ability to use necessary services and information.

To encourage inclusive web design, WCAG are used worldwide as the common standard. Developed by the World Wide Web Consortium (W3C), WCAG includes testable success criteria arranged under four basic principles: Perceivable, Operable, Understandable and Robust which are often summarized as POUR (W3C, 2018). There are particular rules in each principle that handle the unique challenges of accessibility.

Table 2: WCAG 2.1 Principles and Key Guidelines

Principle	Description	Example Guidelines
Perceivable	Information and UI components must be presented in ways users can perceive	Provide text alternatives, use sufficient color contrast
Operable	Interface components and navigation must be operable by all users	Enable keyboard access, avoid flashing content
Understandable	Information and operation of the UI must be understandable	Use clear language, predictable navigation
Robust	Content must be reliably interpreted by assistive technologies	Use valid HTML, ensure compatibility with screen readers

WCAG 2.1 expands upon earlier versions by addressing emerging accessibility issues, including those faced by users with low vision, cognitive disabilities, and mobile device users. While compliance with WCAG is often mandated by law in many countries, its broader value lies in promoting user-centered design that reflects the full diversity of human capability.

II. LEARNING WHAT AGING AND VULNERABLE INDIVIDUALS NEED

Before designing for elderly or vulnerable web users, you need to understand what physical, sensory and cognitive changes may occur while using digital products. When people age, they might find it harder to manage and use information online. Even though these impairments affect a lot of users, they are usually neglected during normal web development.

- **Visual Impairments**

A variety of vision problems become more common with age such as a reduced ability to see contrast, presbyopia and a heightened reaction to light. So, it becomes more difficult for seniors to read texts with low contrast, understand visual symbols or move through interfaces with an excessive amount of items. In addition, individuals affected by age-related macular degeneration often have trouble finding things exactly in the center of the screen.

- **Auditory Impairments**

Because of presbycusis, hearing high-frequency sounds which appear in many alerts, messages and multimedia, may become difficult for some. If audio is used for instructions, but there is no text or captioning provided, that content may be hard to reach for older adults and those who cannot hear well (Charness & Boot, 2009).

- **Motor Impairments**

When people age, their fine motor skills often decrease because they may have arthritis, Parkinson's or just general weakness. Users cannot use their mouse effectively, tap on small items on touchscreens or maintain control over their mouse (Newell & Gregor, 2000). Consequently, interfaces that need speedy or accurate movements can present major challenges.

- **Cognitive Impairments**

As people age, they might experience slower reaction times, a reduced ability to remember things and trouble with paying attention and switching between different tasks. A complicated site, incomprehensible wording and broken design conventions can make things difficult for people affected by mild cognitive impairment or dementia (Kurniawan, 2008). People with intellectual or mental health issues often experience difficulties that are very similar.

- **Bridges between Constructs**

Many people often have different impairments at the same time. For example, older individuals might have difficulty hearing and using their hands well and people in certain communities could experience both thinking problems and limited computer knowledge. Looking at only one part of accessibility may still leave holes in meeting the user's total needs. An essential part of inclusive web design is being understanding and familiar with user challenges. When user-centered research and accessibility heuristics are followed, interfaces continue to be usable by those who need them.

**a. Disabled People, People with Low Computer Knowledge and People Who Can't Afford Technology**

In addition to aging, many people encounter barriers built into systems that make it difficult for them to use technology. Special mention is given to people who have disabilities, a low level of digital knowledge or financial troubles. Unless rightfully connected, these groups often deal with combined exclusion that makes daily activities harder. Someone who is visually, audibly, motor or cognitively impaired often receives limited or no access to content that does not meet the basic standards for accessibility. Websites without supporting features, alternative text or ways to use the keyboard are still very difficult for some (Jaeger, 2012).

A major barrier is the fact that people have low digital literacy. Those who have less experience with computers, mobiles or online software might have difficulties with the jargon, several-step navigation processes and interactions that are common online. The benefits for these users come from simple layout, easy instructions and useful visuals. Rising costs make it even harder for people to participate in online activities. Not everyone from a low-income family can properly use online services, because they lack access to fast internet, up-to-date devices or helpful technology. Some websites may not work correctly for someone using a low-bandwidth phone or a computer at a library which can block access to those pages.
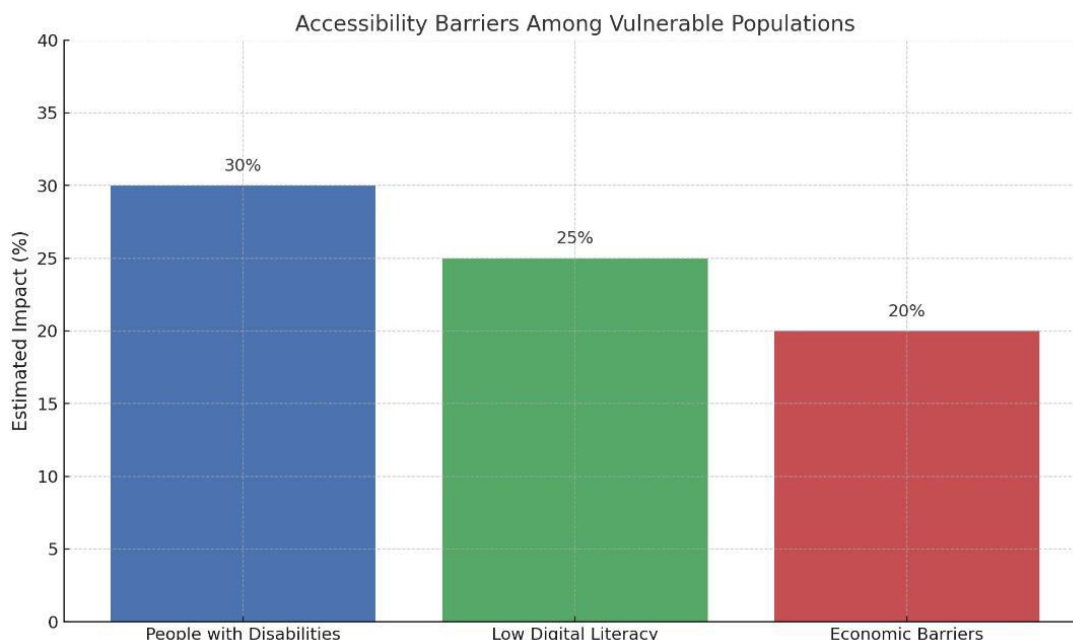
Figure 1. Estimated impact of accessibility barriers among vulnerable populations (Adapted from Jaeger, 2012).

b. Problems Related to Technology and Society in Online Engagement

Focus on technical problems is common in digital accessibility talks, but we also need to think about how society and technology interact. They occur because factors in society, culture or institutions stop people from using even the most well-designed digital tools. An important bar to progress is people's faith in technology. Because of fear of identity theft, wasting their money or being flooded with misleading information, vulnerable or aging groups might avoid using online services (Tsai et al., 2011). When people do not trust the systems, they may avoid using government, healthcare or financial websites.

A lack of social support and being alone are further problems they experience. Individuals from minority groups and older adults might not be able to count on family and friends when learning to use technology. Simple online forms can seem hard for people without proper guidance or training (Selwyn, 2004). Digital inclusion is made harder by differences in culture and language. Because many interfaces lack multilingual content, clear symbols and culturally relevant examples, immigrants, Indigenous groups and people from minority language groups find them less usable (Warschauer, 2003). A site may be technically accessible according to WCAG, yet turn away users whose backgrounds and needs are not considered in the design.

Nonetheless, when areas lack broadband internet, current technology or community internet terminals, this makes it difficult for people to be involved in online activities (van Dijk, 2005). While these issues are outside the scope of UX design, they should be noticed during the preparation of inclusive digital strategies. Because these challenges are socio-technical, we must address accessibility through a combination of technical, social, policy and community efforts.

II. ACCESSIBILITY STANDARDS AND LEGAL FRAMEWORKS

To ensure digital inclusion for all users, particularly aging and vulnerable populations, web designers and organizations must align with established accessibility standards and legal mandates. These standards provide structured guidance to eliminate digital barriers and promote equitable access to information and services.

- **Web Content Accessibility Guidelines (WCAG) 2.1**

The Web Content Accessibility Guidelines (WCAG) 2.1, developed by the World Wide Web Consortium (W3C), are the most widely adopted global standards for web accessibility. WCAG 2.1 builds on earlier versions (WCAG 2.0), introducing additional success criteria specifically aimed at addressing the needs of users with low vision, cognitive limitations, and mobile device usage—areas highly relevant to aging and vulnerable populations (W3C, 2018).

WCAG 2.1 is organized around four foundational principles, commonly known by the acronym POUR:

➢ Perceivable: Information and user interface components must be presented in ways users can perceive, such as through text alternatives for non-text content and adaptable layouts.
➢ Operable: User interface elements must be functional via a range of input methods, including keyboard-only navigation and voice control.
➢ Understandable: Content and interface behaviors should be easy to comprehend and predictable, avoiding complex language or inconsistent navigation.
➢ Robust: Web content must be compatible with a wide range of assistive technologies and future web standards.

Each guideline within WCAG 2.1 includes testable "success criteria" that fall under three levels of conformance:

➢ Level A (minimum): Basic accessibility features.
➢ Level AA (recommended): Addresses the most common and impactful barriers.
➢ Level AAA (enhanced): Highest level of accessibility, though not always practical for all content types.

Achieving Level AA conformance is the most commonly accepted benchmark and is often required by law in jurisdictions with digital accessibility regulations (W3C, 2018).

Table 3: WCAG 2.1 Examples by Conformance Level

Level	Success Criterion	Example Implementation
A	Non-text Content	Provide alt text for images
AA	Contrast Minimum (4.5:1 for text)	Ensure text contrasts well against background
AA	Keyboard Navigation	Allow full functionality via keyboard input
AAA	Sign Language Interpretation	Provide sign language interpretation for multimedia
AAA	Reading Level	Ensure content can be read by someone with lower literacy

• **Legal and Policy Frameworks**

In many countries, adherence to accessibility standards such as WCAG is not just a best practice but a legal requirement:

➢ **United States**: Section 508 of the Rehabilitation Act mandates that federal agencies ensure ICT accessibility for individuals with disabilities.
➢ **European Union**: EN 301 549 requires public sector websites and mobile applications to meet WCAG 2.1 Level AA standards.
➢ **Canada**: The Accessible Canada Act (2019) enforces digital accessibility across federal organizations.
➢ **United Kingdom**: The Equality Act 2010 requires service providers to make reasonable adjustments for disabled users, including digital platforms.

Failure to comply with these frameworks can lead to legal penalties, reputational damage, and user exclusion (Lazar et al., 2015).

Accessibility standards like WCAG 2.1 thus serve as both a compliance benchmark and a design blueprint, guiding organizations toward more inclusive and universally usable digital experiences.

• **Accessibility Standards and Legal Frameworks**

Designing accessible web interfaces is not only a matter of best practice—it is increasingly mandated by law. Countries around the world have implemented legal frameworks that require digital content and services to be accessible to people with disabilities. These frameworks emphasize both the technical compliance with accessibility standards and the ethical responsibility to ensure inclusive digital participation.

1. United States: ADA and Section 508

In the United States, the Americans with Disabilities Act (ADA) prohibits discrimination against individuals with disabilities in all areas of public life, including digital spaces. While the ADA does not explicitly mention websites, courts have increasingly interpreted it to apply to public-facing websites and mobile applications, particularly for businesses and public services (Lazar et al., 2015).

In parallel, Section 508 of the Rehabilitation Act mandates that federal agencies make their electronic and information technology accessible to people with disabilities. The updated Section 508 standards, aligned with WCAG 2.0 Level AA, apply to federal websites, software, documents, and digital communications. These rules establish a technical baseline that public entities must meet to ensure usability by people with a wide range of abilities.

2. European Union: EN 301 549

The European Union's EN 301 549 standard sets accessibility requirements for public sector websites and mobile apps. It references WCAG 2.1 and expands the legal mandate to include not only web content but also software, hardware, and documentation. EU Directive 2016/2102 ensures that all public sector digital services are perceivable, operable, understandable, and robust for users with disabilities.

Compliance with EN 301 549 is now obligatory across EU member states, and organizations must publish accessibility statements to declare the level of conformance and any known exceptions.

1. Global Accessibility Legislation

Many other nations have adopted similar legal frameworks:

- Canada: The Accessible Canada Act (ACA) mandates digital accessibility in federal sectors.
- Australia: Government websites must comply with WCAG 2.0 under the Disability Discrimination Act.
- Japan: The Act on the Elimination of Discrimination against Persons with Disabilities promotes ICT accessibility.
- United Kingdom: The Equality Act 2010 requires reasonable adjustments to digital services for disabled users.

2. Legal Compliance and Ethical Responsibility

While legal compliance provides the structural impetus for accessible design, ethical responsibility remains a compelling motivator. Creating equitable digital environments supports the broader values of dignity, autonomy, and inclusion. For aging and vulnerable users, accessible design can be the difference between empowerment and exclusion.

Ethically responsible organizations recognize that accessibility is not merely a checklist item but a core component of user-centered design. By aligning legal mandates with empathetic practices, developers and decision-makers can foster trust, increase reach, and meet the needs of an increasingly diverse digital audience.

IV. MAIN DESIGN CONCEPTS FOR ACCESSIBILITY

The four main aspects of accessible web design—Perceivable, Operable, Understandable and Robust (known as POUR)—come from the Web Content Accessibility Guidelines (WCAG). As a result of these principles, digital materials are accessible to people who are aging or particularly vulnerable.

Perceivable

Users need to be able to understand content in any way that suits their particular abilities. Because of this, visually impaired users can understand pictures and symbols found on websites. In the same way, people with hearing problems can benefit from captions and transcripts on videos. Balancing the contrast between text and background makes things easier for people with low vision or a color blindness condition (W3C, 2018).

Operable

All users should have the ability to interact with every interface element. This calls for websites to allow users to navigate using only keyboard commands, to help people with movement problems who can't use a mouse. Adjustable

session timeouts are an example of features that make the system more useful for users with cognitive or mobility problems (W3C, 2018).

Understandable
Both the written information and links on a website should be easy for anyone to use. Clearly written text, the same user interface designs and regular site navigation help those with challenges stay oriented and understand the content of a website (W3C, 2018).
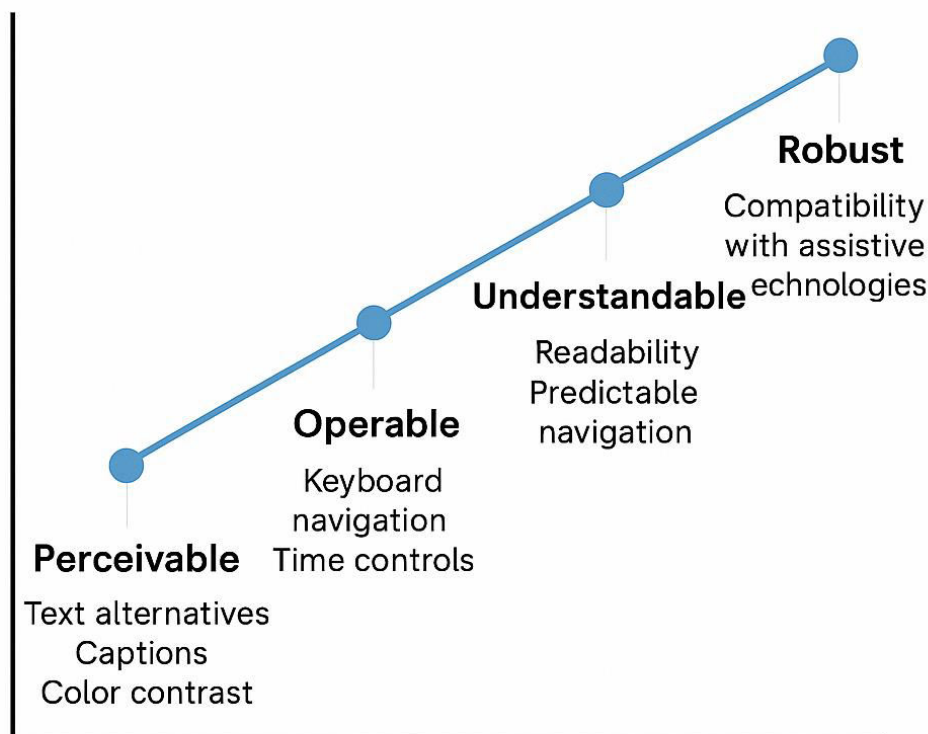

Figure 2: Visualization of Key Design Principles for Accessibility Based on WCAG and Inclusive Design Frameworks

Robust
Painting, videos, audio and text should all function well with assistive technology now and in the future. To do this, make good use of HTML structure, strictly follow web standards and guarantee that all content can be read by screen readers, magnifiers and voice interfaces. Strong robustness means users can see and read the content on various electronic gadgets as well as platforms developed on the web (W3C, 2018).

These frameworks are all about Inclusive Design
As well as WCAG, leading groups such as Microsoft are bringing in their own inclusive design principles for developers focused on inclusive design. Being inclusive in design means Microsoft's toolkit teaches us to understand users' diversity, address unique situations and ensure users can adapt to the design (Microsoft, 2016). Using this strategy, products should be designed with and not just for disabled users.
Inclusive design means thinking about design in a way that fits people of any age or physical situation (such as someone recovering from an arm injury or looking after a child). Making design welcoming to everyone means it becomes usable by everyone, not just those with permanent impairments.

V. TECHNOLOGIES AND TOOLS SUPPORTING ACCESSIBLE DESIGN

To ensure that web interfaces are accessible to aging and vulnerable populations, designers and developers must leverage a wide array of assistive technologies and evaluation tools. These technologies not only help users interact with digital content but also support developers in identifying and fixing accessibility barriers.

- **Assistive Technologies**

Assistive technologies are hardware and software tools that help individuals with disabilities navigate, interact with, and comprehend digital content. Key examples include:

✓ **Screen Readers:** Tools like JAWS (Job Access With Speech) and NVDA (NonVisual Desktop Access) convert digital text into synthesized speech or Braille output. These are essential for blind and low-vision users, enabling them to perceive textual, structural, and navigational elements on a webpage (WebAIM, 2021).

✓ **Screen Magnifiers:** Tools such as ZoomText provide magnification, color customization, and pointer enhancements to assist users with low vision in reading and interpreting content more easily.

✓ **Speech Input Systems:** Solutions like Dragon NaturallySpeaking enable users with mobility impairments to control their devices and input text via voice commands, reducing reliance on a keyboard or mouse (Gonzalez et al., 2022).

These technologies greatly enhance usability but depend on well-structured and accessible content. For example, a screen reader cannot interpret images without appropriate alt text, nor can a voice navigation tool interact with unlabeled buttons.

Accessibility Testing Tools

Ensuring that a web interface is accessible requires both manual testing and the use of automated evaluation tools:

✓ **WAVE (Web Accessibility Evaluation Tool):** Developed by WebAIM, WAVE provides visual feedback on web content accessibility, highlighting areas such as missing alt text, low color contrast, and form label errors.

✓ **Axe by Deque Systems:** An open-source library and browser extension that automatically detects accessibility violations in real-time, suitable for integration into development pipelines.

✓ **Google Lighthouse:** A browser-based audit tool that evaluates performance, SEO, and accessibility. It provides a quantitative accessibility score and suggests actionable fixes.

These tools, while powerful, must be complemented by human evaluation, particularly to assess usability and cognitive clarity, which automated tools cannot measure.

AI-Enhanced Accessibility Features

Recent advances in artificial intelligence (AI) are expanding the boundaries of digital accessibility. AI-powered features such as automatic image description generation, real-time speech captioning, and adaptive UI personalization are making digital interfaces more responsive to user needs (Gonzalez et al., 2022). For example, Microsoft's Seeing AI and Google's Lookout apps use computer vision to narrate the visual world to users with vision loss.

AI can also dynamically adjust content layout and complexity based on user preferences or detected impairments, offering an unprecedented level of personalized accessibility. While these technologies are still evolving, their potential for inclusive design is significant.

VI. EXAMPLES AND STUDIES IN ACTUAL SETTINGS

Looking at how accessibility principles are used in the real world teaches us what helps and what does not for seniors and other vulnerable populations. Healthcare, e-government and e-commerce are key areas because many users may have different abilities and requirements.

Healthcare Portals

Using digital health platforms allows seniors with chronic diseases to get needed care. Research reveals that a lot of healthcare websites do not meet the required accessibility standards. Shi et al. (2020) found over 60% of hospital portals did not offer alt text for images, used colors that don't stand out or had confusing labels for links. Such things make websites hard to use with screen readers and add extra strain for older people.

In contrast, MyChart by Epic Systems does well as a positive example. Its design includes oversized text, identifying icons, high contrast in colors and e simple way to schedule appointments. Because of these features, elderly patients, as well as those with vision or dexterity problems, find it much easier to manage the devices.
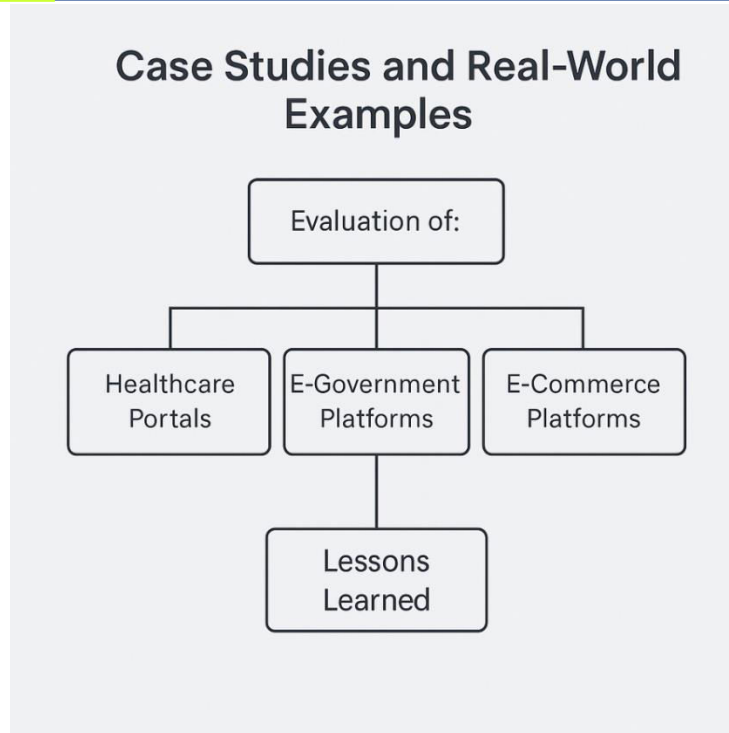
Figure 3: Case Studies and Real-World Examples of Accessible Design

E-Government Platforms

According to rules, public sector websites are required to assist everyone, including people with disabilities. The U.S. Social Security Administration's (SSA) website shows how accessibility works best: it has keyboard navigation, clear text, is readable by screen readers and adapts to any device.

In that same year, researchers examined EU local government websites and found many violations of WCAG—mainly in PDFs and on interactive screens (Shi et al., 2020). Some failures occurred because fields weren't properly labeled and focus wasn't clear, making it harder for users who use assistive technology.

E-Commerce Platforms

While e-commerce websites want to serve every user, many leave out those with disabilities. A lawsuit led Target to convert its platform into what it is now. After performing thorough audits and training, Target changed its site to ensure users could navigate easily, use accessible forms and see the correct ARIA labels. Because of this, the company complied with laws and saw better usability for everyone using the services.

Meanwhile, there have been complaints about Amazon, especially for making some features inaccessible to users and for overladen pages that have very little alt text describing the images.

VII. PROBLEMS IN PUTTING PLANS INTO PRACTICE

Although more people are aware of accessibility, many companies still find it difficult to apply accessible web design. Often, design challenges in these specific areas—money, tradition, looks and technology—mean accessibility is something that comes after the main tasks, instead of always being there from the start.

Limited money and materials are involved in the process of production

Almost every resource mentions that the believed high cost of accessibility is a major barrier. When money is tight for public and nonprofit organizations, functionality and speed are sometimes placed above making websites accessible to all. Improving accessibility, fixing old systems and handling specialist roles usually cost something upfront. A few

studies suggest that making sites more accessible can save money in the long run and make them easier for more users to navigate (Cooper et al., 2012).

Unknown and Unrecognized Signs

A lot of design and development teams do not get professional training on accessibility laws like WCAG. If you don't understand user needs, you may end up missing out on some users. Stakeholders might not see how accessibility supports the company from a legal, ethical and business viewpoint, so they might regard it as something not important. Often, people resist internalization because they think accessibility serves few and limits how things are made or how they could look. Actually, when a website is accessible it works better for every user, even those with brief disabilities.

Whether Appearance Supersedes Access or the Other Way Around

A number of designers are concerned that guidelines for accessibility can make design less flexible. Sometimes, because of this tension, the look of the site becomes more important than its usefulness. Adding light-gray text on white and making designs dependent on mouse-hover effects appears neat, even today—but it's not easy for older adults or users with visual impairments (Cooper et al., 2012).

Even so, being accessible and visually attractive are not incompatible. Sets of design guidelines are now created to cover both sides, adding contrast-based color palettes, adaptable fonts and inclusive user interface designs that have a sleek and elegant appearance.

Issues in both Organization and IT

Accessibility practices may not be implemented the same way when teams within a larger company work in isolation. As an example, if the marketing team doesn't partner with developers, important files could be PDFs or multimedia products that can't be opened. Likewise, it's possible that procurement teams will use third-party platforms without considering accessibility.

Efforts are slowed on the online side by inflexible legacy technology, restricted third-party tools and systems with lots of advanced JavaScript content. Even if accessibility is important to an organization, if there isn't a good governance process, efforts may not be coordinated and may underperform.

VIII. BEST WAYS AND ADVICE

Instead of regarding accessibility as a task to be completed, we should include it deeply in how we design digital services. The steps below guide organizations on how to include accessibility at each stage of their work and within their company culture.

Make Accessibility an Important Consideration Right from the Start

Part of good design is making sure accessibility is built into every stage of the development process instead of added to the product after completion. Starting with accessibility from wireframing and early prototypes allows teams to avoid having to add it later, thus making their digital products suit the needs of all users.

Enterprise design systems and style guides should be sure to mention accessibility measures like easily scaling fonts, semantic HTML coding and using high contrast ratios. Getting the three teams together early on supports better collaboration between designers, developers and QA testers.

Include Users with Disabilities in the Process of Design

According to UCD, organizations ought to have people with disabilities involved in tests, feedback and group-creating sessions. Make sure that people with disabilities help test your site, to ensure accessibility choices are based on accurate needs, not ideas.

As a result, we can catch problems with usability that automated testing wouldn't notice such as how heavy some pages are for the brain to process or the extra time it takes using a screen reader to finish a form.

Training and Auditing Accessibility All the Time

As technology improves and what users want changes, accessibility also grows and develops. To keep leaders ahead of standards, all team members should be trained regularly.

Just as with key coordination, carrying out regular audits in different ways is necessary. Such audits need to check both digital compliance and practical usability. If you sue Axe, WAVE and Lighthouse, then check with screen readers and find out how things look without the use of a mouse, you can evaluate accessibility more fully.

Create and work with both Personas and Empathy Maps.

Together, teams must create user roles that represent seniors and people with different impairments like those related to eyesight, movement, hearing and thinking.

Empathy maps let you see and understand what the user experiences as they interact with your site or app. Such tools help designers relate to accessibility problems and bring groups working together to focus on what users need, resulting in better design choices (Pruitt & Adlin, 2006).

IX.CONCLUSION

Digital equity in a world where everything is online relies on the practice of inclusive web design. Since aging people rely on technology for healthcare, government and commercial activities, providing services that are easy to use for all is not just required, but also a good strategy. It has explained the specific challenges that older and at-risk people encounter such as those tied to sight, thinking skills, walking and Internet use. The document introduces regulations, current case studies and new technologies to show that accessibility is essential in modern web development. All groups, including designers, developers and policymakers, need to be fast and thoughtful. Adding accessibility early on, listening to user feedback and keeping up with improvements help us make sure every digital platform users feel respected, valued and included. The thing to understand is that accessibility is an essential part of website design, not just a special feature. We should design with care, build with care and lead with inclusion.

REFERENCES

1. Czaja, S. J., & Lee, C. C. (2007). The impact of aging on access to technology. Universal Access in the Information Society, 5(4), 341–349. https://doi.org/10.1007/s10209-006-0060-x
2. Choi, N. G., & DiNitto, D. M. (2013). Internet use among older adults: Association with health needs, psychological capital, and social capital. Journal of Medical Internet Research, 15(5), e97. https://doi.org/10.2196/jmir.2333
3. Vaportzis, E., Clausen, M. G., & Gow, A. J. (2017). Older adults perceptions of technology and barriers to interacting with tablet computers: A focus group study. Frontiers in Psychology, 8, 1687. https://doi.org/10.3389/fpsyg.2017.01687
4. Sayago, S., & Blat, J. (2010). Telling the story of older people learning ICT usage: Emerging metaphors and the role of design. Interacting with Computers, 22(6), 507–517. https://doi.org/10.1016/j.intcom.2010.04.004
5. Buzzi, M. C., Henschke, A., & Kirschenbaum, S. (2017). Usability of websites for seniors: A systematic review. Universal Access in the Information Society, 16(1), 123–136. https://doi.org/10.1007/s10209-016-0488-6
6. Rogers, W. A., & Fisk, A. D. (2010). Toward a psychological science of advanced technology design for older adults. Journal of Gerontology: Psychological Sciences, 65B(6), 645–653. https://doi.org/10.1093/geronb/gbq053
7. Heart, T., & Kalderon, E. (2013). Older adults: Are they ready to adopt health-related ICT? International Journal of Medical Informatics, 82(11), e209–e231. https://doi.org/10.1016/j.ijmedinf.2011.10.004
8. Fischer, S. H., David, D., Crotty, B. H., Dierks, M., & Safran, C. (2014). Acceptance and use of health information technology by community-dwelling elders. International Journal of Medical Informatics, 83(9), 624–635. https://doi.org/10.1016/j.ijmedinf.2014.06.005
9. Mitzner, T. L., Boron, J. B., Fausset, C. B., Adams, A. E., Charness, N., Czaja, S. J., Dijkstra, K., Fisk, A. D., Rogers, W. A., & Sharit, J. (2010). Older adults talk technology: Technology usage and attitudes. Computers in Human Behavior, 26(6), 1710–1721. https://doi.org/10.1016/j.chb.2010.06.020
10. Park, H., & Magerko, B. (2016). Designing technology for older adults: Results from user-centered design studies. Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems, 3062–3069. https://doi.org/10.1145/2851581.2892467
11. Grady, J., & Melton, G. B. (2011). Accessibility of mobile technologies for older adults: Barriers, needs, and preferences. Gerontechnology, 10(3), 158–167. https://doi.org/10.4017/gt.2011.10.3.003.00
12. Jansen-Kosterink, S., van Velsen, L., & Hermens, H. (2015). Acceptance and use of home telemonitoring devices by older adults: A systematic review. International Journal of Medical Informatics, 84(9), 681–693. https://doi.org/10.1016/j.ijmedinf.2015.05.005
13. Greenhalgh, T., Wherton, J., Sugarhood, P., Hinder, S., Procter, R., & Stones, R. (2013). What matters to older people with assisted living needs? A phenomenological analysis of the use and non-use of telehealth and telecare. Social Science & Medicine, 93, 86–94. https://doi.org/10.1016/j.socscimed.2013.05.036
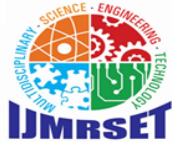
14. Charness, N., & Boot, W. R. (2009). Aging and information technology use: Potential and barriers. Current Directions in Psychological Science, 18(5), 253–258. https://doi.org/10.1111/j.1467-8721.2009.01647.x

15. Astell, A. J., Alm, N., Gowans, G., & Ellis, M. P. (2010). Designing cognitive prosthetics for older adults. Gerontechnology, 9(1), 39–46. https://doi.org/10.4017/gt.2010.09.01.006.00

16. Seifert, A., & Schelling, H. R. (2018). The use of digital media by older adults in Switzerland: A population-based study. International Journal of Environmental Research and Public Health, 15(8), 1784. https://doi.org/10.3390/ijerph15081784

17. Hanson, V. L. (2010). Aging and accessibility: The challenge of designing for older users. Interacting with Computers, 22(6), 473–483. https://doi.org/10.1016/j.intcom.2010.07.003

18. Czaja, S. J., & Sharit, J. (2009). Age differences in attitudes toward computers. Journal of Gerontology: Psychological Sciences, 64B(3), 363–370. https://doi.org/10.1093/geronb/gbp027

19. Hill, R., Betts, L. R., & Gardner, S. E. (2015). Older adults' experiences and perceptions of digital technology: (Dis)empowerment, wellbeing, and inclusion. Computers in Human Behavior, 48, 415–423. https://doi.org/10.1016/j.chb.2015.01.062

20. Czaja, S. J., & Lee, C. C. (2012). Designing technology for older adults. In R. W. Pew & G. A. Mavor (Eds.), National Research Council Report: Aging and technology. National Academies Press. https://doi.org/10.17226/13439

21. Wagner, N., Hassanein, K., & Head, M. (2010). Computer use by older adults: A multi-disciplinary review. Computers in Human Behavior, 26(5), 870–882. https://doi.org/10.1016/j.chb.2010.03.029

22. Czaja, S. J., Lee, C. C., & Arana, N. (2018). Technological interventions for older adults: Challenges and opportunities. Gerontechnology, 17(2), 65–73. https://doi.org/10.4017/gt.2018.17.2.001.00

23. Heart, T., & Kalderon, E. (2013). Older adults: Are they ready to adopt health-related ICT? International Journal of Medical Informatics, 82(11), e209–e231. https://doi.org/10.1016/j.ijmedinf.2011.10.004

24. Lindsay, S., & Bone, J. (2017). Designing accessible technology for older adults: A case study of touch screen user interfaces. Universal Access in the Information Society, 16(3), 511–521. https://doi.org/10.1007/s10209-016-0482-z

25. Charness, N., & Boot, W. R. (2016). Technology, gaming, and social networking. The Gerontologist, 56(3), 377–388. https://doi.org/10.1093/geront/gnu031

26. Vroman, K. G., Arthanat, S., & Lysack, C. (2015). "Who over 65 is online?" Older adults' dispositions toward information communication technology. Computers in Human Behavior, 43, 156–166. https://doi.org/10.1016/j.chb.2014.10.018

27. Dickinson, A., & Hill, R. (2007). Understanding e-inclusion. British Journal of Educational Technology, 38(4), 635–646. https://doi.org/10.1111/j.1467-8535.2007.00736.x

28. Czaja, S. J., Sharit, J., & Hernandez, M. A. (2012). Age differences in the performance of self-paced web-based tasks. Gerontology, 58(2), 183–190. https://doi.org/10.1159/000334182

29. Mitzner, T. L., Rogers, W. A., & Fisk, A. D. (2019). Technology adoption by older adults: What we know and what we need to learn. The Gerontologist, 59(1), 15–18. https://doi.org/10.1093/geront/gny146

INTERNATIONAL JOURNAL OF

MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING AND TECHNOLOGY

| Mobile No: +91-6381907438 | Whatsapp: +91-6381907438 | ijmrset@gmail.com |

www.ijmrset.com