Why Accessibility Matters and Where to Start

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Foxit
39355 California Street, Suite 302
Fremont, CA 94538, USA

Sales: 1-866-680-3668
Support: 1-866-693-6948
Or 1-866-MYFOXIT

Support Center
www.foxit.com

What is Accessibility?

In general terms, accessibility is defined as the design of products, services, devices, and environments for people with disabilities. With approximately 20% of the US population having some form of disability[1], accessibility is a crucial and longstanding practice that promotes societal inclusion. We see accessible designs in our lives, but may not actually realize it. Examples include buildings with access ramps and elevators for wheelchair users or audio prompts at road crossings for legally blind pedestrians. For deaf individuals, text transcripts are sometimes made available for audio and video recordings. Such designs help individuals with disabilities overcome barriers, granting them access to facilities like anyone else.

But accessibility extends well beyond overcoming physical barriers to access. About 8.5% of the population has a disability impeding internet and computer usage[2]. This and the ever-growing dependence on digital technology for information and communication has led to a need to incorporate accessibility tools that overcome digital access barriers.
Basic practices are already in place. For deaf users watching a video, closed captioning is commonly used to display text for them to read. Visually impaired users reading digital content leverage screen readers that read the text aloud for them to hear. Such tools ensure that digital technology is accessible to all, especially those with disabilities. The digital accessibility

we will discuss in this article relates to the PDF format. The PDF format is one of the most widely used and distributed formats in the world, known for its ability to maintain its look and feel regardless of operating system or devices. Because of its significant usage, it's important to make PDF files accessible for those with disabilities. When a PDF file is digitally accessible, users with disabilities can read and navigate through it.

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[1] *"Overview of Document Accessibility for Users with Disabilities." Utah State University College of Education and Human Services,*
https://usucourses.instructure.com/courses/574/pages/overview-of-document-accessibility

[2] *"Overview of Document Accessibility for Users with Disabilities." Utah State University College of Education and Human Services,*
https://usucourses.instructure.com/courses/574/pages/overview-of-document-accessibility

Who Benefits from Accessibility?

Accessibility is meant to benefit all, regardless of a person's ability. When properly implemented, information and communications can be conveyed across a diverse range of people, excluding no one. Accessibility takes into account all walks of life. There are, however, specific groups of people where accessibility is an absolute necessity:

People with Disabilities - Those with disabilities stand to benefit the most from accessible technology. A disability is defined as a condition that "impairs, interferes with, or limits a person's ability to engage in certain tasks or actions or participate in typical daily activities and interactions"[3]. While types of disabilities are far-ranging, they can be categorized by the following:

1. Visual disabilities - Those who are blind, color-blind, or have low vision

2. Auditory disabilities - Those who are deaf or hard of hearing

3. Motor disabilities - Those with physical deficits that hinder their operation of a computer

4. Cognitive disabilities - Those with learning deficits that hinder learning and comprehension

Individuals who have such disabilities are often born with them at birth, usually staying with them during their lifetime. As such, their lives and are substantially affected and opportunities are limited. Accessibility tools were built primarily with this group in mind.

The Elderly - Another group benefitting from accessibility are actually those who aren't born with a permanent disability. As the human body ages, its ability to perform daily tasks becomes gradually more difficult. For example, words and images become harder to see clearly, while sounds become harder to hear. This is particularly true amongst the elderly whose vision, hearing and mobility start to decline with age. More, the 65 and older population is projected to make up 20% of the population by 2030. Additionally, 67% of seniors are now using the internet[4]. As the population gets older, accessibility features become necessary in order to continue accessing information.

Organizations - In an era of increasing dialogue around inclusion, it's imperative that companies consider accessibility as a significant part of their strategy. By integrating accessibility features in their communications, companies are sending a loud and clear message that they want to include as many audiences as possible, thus boosting their brand perception among potential customers. Conversely, a company that neglects to implement accessible communications risks lawsuits filed by disability advocacy groups. In 2018 alone, there were 2,258 lawsuits related to digital accessibility[5], no doubt hurting the brands of companies who failed to take a more inclusive stance.

③ *Merriam-Webster Dictionary Definition, https://www.merriam-webster.com/dictionary/disability*

④ *Accessibility Marketing Trends Webinar, Level Access*

⑤ *"The State of Digital Accessibility 2019", Level Access, https://www.levelaccess.com/state-of-digital-accessibility-2019/*
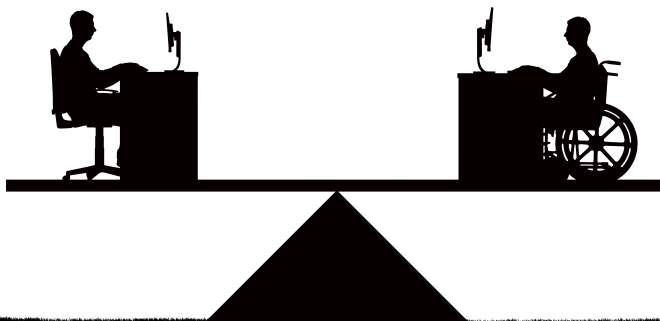
The Basics

Because accessibility affects so many groups of people, it's no surprise that it is an extremely broad topic. Integrating accessibility into your design strategy can be a daunting process that should be considered at the beginning of the development cycle. If accessibility is only considered after a product is fully designed (or worse, when a lawsuit is filed) then deep remediation is required, consuming even more resources. Successful accessibility integration requires collaboration between many teams within an organization, including product, design (UI/UX), engineering, marketing, and legal/compliance. To get a firm grasp on accessibility, a couple of standards should be referenced.

Americans with Disabilities Act (ADA) - In 1990, the Americans with Disabilities Act (ADA) was signed by the Bush administration, prohibiting discrimination on the basis of disability. Much like the Civil Rights movement in 1964, which made it illegal to discriminate based on race, gender, religion and national origin, the ADA provides persons with disabilities protection from discrimination, granting equal opportunities to employment as well as the enjoyment of public goods. More specifically, Title III of the ADA mandates the removal of architectural barriers of public

accommodations that hinder a person with a disability from gaining access. In 2018, the Department of Justice clarified that Title III applies to websites of public accommodation, even in the absence of formal regulation[6]. While ADA doesn't address digital accessibility specifically, it does lay a foundation for which many of today's principles are based on.

Section 508 - For federal agency workers, integrating accessibility in their communications is required by law. Section 508 of the Rehabilitation Act of 1973 (or simply Section 508) states that federal workers are required to develop, procure, maintain and use information and communications technology (ICT) that is accessible to people with disabilities, whether they are a federal worker or not[7]. Section 508 mandates that all publicly available content produced by federal agencies, including (but not limited to) documents, websites, audio clips, and videos be made accessible to anyone who wants access. While Section 508 is a US law that impacts the federal government, many states have adopted similar accessibility laws or have made good-faith efforts to make sites as accessible as possible[8]. Other countries have also adopted similar accessibility laws. Thus, it is paramount to leverage the proper practices and tools to ensure communication technology is Section 508 compliant.

[6] Department of Justice, https://images.cutimes.com/contrib/content/uploads/documents/413/152136/adaletter.pdf
[7] Section 508 Policy, https://www.section508.gov/manage/laws-and-policies#508-policy
[8] Section 508 State Policy, https://www.section508.gov/manage/laws-and-policies/state

WCAG 2.0 Standard - Web Content Accessibility Guide (WCAG), published by the Web Accessibility Initiative (WAI), is one of the most widely-adopted standards for achieving digital accessibility. They are a set of recommendations for making web content accessible for people with disabilities. WCAG 2.0 was published in 2008, becoming an ISO standard (ISO/IEC 40500:2012) in 2012. WCAG 2.0 follows a set of recommendations with a goal of making web content satisfy 4 principles: Perceivable, Operable, Understandable, and Robust (POUR):

1. Perceivable - Information and communications must be presented in a way that can be perceived

2. Operable - Users must be able to operate the interface

3. Understandable - Users must able to understand the information

4. Robust - Content must be robust enough for it to be interpreted by a wide variety of user agents, such as assistive technology

Within each of these principles are a set of comprehensive guidelines explaining how to satisfy the principle. Testing is required to measure whether a design has successfully adhered to the guidelines or not. As such, WCAG 2.0 assigns a conformance level for success criteria to each specific guideline:

- **A** - Meeting Level A conformance includes basic practices like adding alternate text to images and not using colors to convey information. If conformance Level A is not met, the design is likely preventing certain people with disabilities from information access.

- **AA** - Meeting Level AA includes additional accessibility practices such as making content headings and labels descriptive or presenting text using an approved contrast ratio. If conformance Level AA is not met, users will likely experience confusion and frustration when accessing the content.

- **AAA** - Level AAA conformance provides accessibility enhancements like including sign language for audio content. As the success criteria in Level AAA does not apply to all forms of communication, meeting this conformance level is not required to achieve accessibility [W3C].

To minimize the chance of accessibility lawsuits, it is recommended that companies meet Levels A and AA in full when developing their product and/or communications. Successfully addressing each of the POUR principles ensures that content and communications are accessible to as many different groups as possible.

WCAG 2.1 - WCAG 2.1 was introduced by W3C in June 2018 and further expands on the WCAG 2.0 standard, adding additional 17 success criteria. It was introduced to improve accessibility guidance specifically for users with cognitive and learning disabilities, users with low vision, and mobile accessibility. While WCAG 2.0 remains the industry standard, WCAG 2.1 is backward compatible, containing all the elements from its predecessor. Therefore, all success criteria met in WCAG 2.1 will be met in 2.0 as well.

PDF/UA - To ensure future access to PDF documents for all, the PDF/UA standard was introduced in 2012[9]. Officially known as ISO-14289-1, it represents one of the most stringent standards for accessibility compliance. PDF/UA actually builds off of WCAG 2.0, the international standard used by legislative bodies. By meeting the PDF/UA standard for compliance, a document is automatically complying with those guidelines. The "UA" extension, which stands for Universal Accessibility, identifies a specific set of PDF functions (such as text content, images, and metadata) and instructs on how to make them universally accessible. Notable examples include adding tags to meaningful content and creating a structure tree that represents a document's logical reading order. Making a document PDF/UA compliant, beyond WCAG 2.0's standards requires a significant amount of time and effort, and may go beyond what is required by corporate policy, so it's important to assess time constraints before taking this approach.

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[9] *"PDF/UA in a Nutshell", https://www.pdfa.org/wp-content/until2016_uploads/2013/08/PDFUA-in-a-Nutshell-PDFUA.pdf*

Accessibility Best Practices

Before addressing a PDF file's accessibility, it is highly recommended that its source document be optimized first. Creating source documents optimized for accessibility will save a great deal of effort later on. This will require a tremendous amount of attention to detail. Many factors must be carefully considered to make a source document accessible. Below is an overview of key practices that will optimize a document for accessibility.

Document Structure

How a document is structured is one of the most critical components for maximizing accessibility. Users who are unable to directly read text from documents rely on assistive technology like screen-reading software to aid them. Screen-readers scan through the information of a document and reads it out loud to the user. For basic one-pagers read from top to bottom, this is acceptable, but documents usually contain multiple pages with complex formatting. More, screen-readers do not inherently understand the logical structure of a document and rely on correct formatting from the creator. Documents should be structured in the following ways:

Headings - Lengthier documents break up information by sections and subsections, which are represented by headings. Like most users, visually disabled users need to quickly skim through pages to find the information they need. Thus, they depend on descriptive headings to gain a quick overview of each section. Screen-readers help with this but require each document section to have the right type of heading. Placing headings and subheadings in the right order enables screen readers to identify how a document should be read. Within word processors, headings can be classified by hierarchy level. For instance, the most prominent heading is a document title, listed as Heading Level 1. A subheading contained within that is listed as Heading 2. Screen readers will identify a heading to the user as a document is being read (Ex: "The Bill of Rights - Heading Level 1, The First Amendment - Heading Level 2"). A clearly and logically structured document allows screen reader users to jump around a document by its headings.

Tables - Documents containing tables also need to be correctly identified for accessibility. In addition to identifying the table itself, the table's "headers" also need to be labeled. These are the columns and rows, which define the data values within a table. When creating a table, be sure to distinguish the column and row headers from the rest of the cells. Properly labeling these enables screen readers to scan through a table logically, reading a cell along with the column and row where it is located. When a table has its column and row headers clearly identified, users with visual disabilities can easily navigate and comprehend its complexity, even without seeing it.

Lists - Lists are used to present information in points and steps that are easy to follow. Lists are best utilized when a document contains a collection of related information, such as a to-do list or instructions to fix a watch. Compared with using paragraphs, instructions formatted as lists are easier to analyze. This primarily benefits users with cognitive disabilities as information presented in smaller chunks is easier to scan and process. Screen readers can identify all the lists within a document and read off points within a given list.
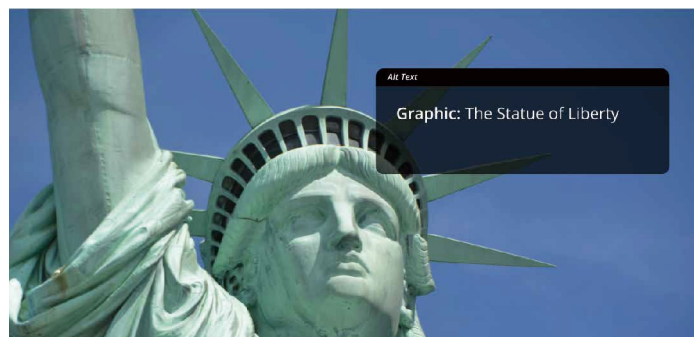
Alternative Text

Images contained in documents also need to be communicated to people with users with visual impairments and are not automatically understood by screen readers. Thus, it is important to add alternative text (Alt Text) to accompany images. Alt Text is a quick description of an image, usually located nearby. For all images that contain content or serve a specific function (Charts, graphs, tables, etc.), it is recommended to manually add Alt Text in the description field contained in the word processor. Images that do not require Alt Text are those that are purely decorative or already have accompanying text. When integrated properly, screen-reading software will identify the image as such and then read the accompanying Alt Text (Ex: "Graphic: The Statue of Liberty"). Alt Text helps users with visual impairments understand an image seamlessly within the document.

Alt Text

Graphic: The Statue of Liberty

Color Contrast

Contrast refers to the variance in color between text and its background. For visually impaired users, having a strong color contrast is critical for reading documents. To ensure strong contrast, always use a dark text against a light background or vice versa. WCAG 2.1 requires a document to meet a minimum contrast ratio of 4.5:1 in order to meet Level AA compliance. For large scale text with 18 points and up, the minimum contrast ratio is 3:1. For reference, black text set against a white background has a contrast ratio of 21:1, the highest contrast possible. Low color contrast makes reading documents difficult for all users, but especially for those with low vision.

Remediating PDFs and Tagging

As mentioned, it is best to integrate accessibility features at the beginning of a product life cycle, starting with the source document. When the source document implements accessibility practices from the very beginning, it is well on its way to optimization and is ready to export as a PDF file. But if the source document was created without accessibility in mind, assistive technology will have trouble reading it logically. In this situation, moderate to heavy remediation is required. PDF remediation is the practice of making a PDF accessible.

If the source document wasn't made accessible or no source document is available, tagging is the first step. Tags are the cornerstone of remediating an inaccessible PDF file. A tag identifies and describes a file's containing elements to screen-reading software. Tagging ensures that a PDF file's content and structure is correctly described and ready to be distributed to users of assistive technology. Without it, it is impossible for a screen-reader to understand a PDF file. Therefore, all elements of a PDF file -- from top to bottom -- must be accounted for. From high-level items like headings, down to granular-level items like one cell in a table must be manually applied with the correct tag. For lengthy documents without a source, this will require a great deal of time and effort. If the source document was created with accessibility formatting, then correct tagging will automatically be created when it's exported to a PDF file. It cannot be understated how important it is to start accessibility optimization with source documents.
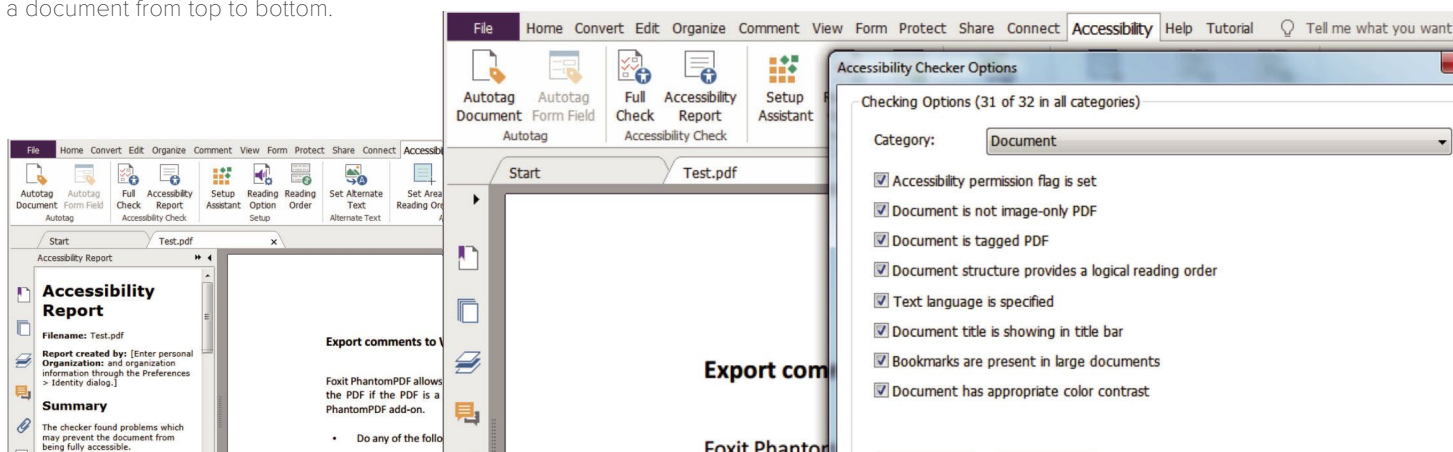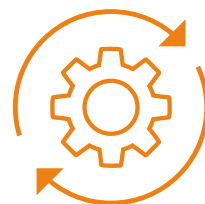
Foxit Software Solutions

When a source document isn't available, tagging for accessibility is simply unavoidable. It is a time-consuming but necessary process. Foxit Software offers a wealth of accessibility tools to streamline this task. PDF files created with Foxit products ensure compliance with Section 508 and WCAG 2.0 standards thanks to unique features that automate remediation processes to reduce time and effort.
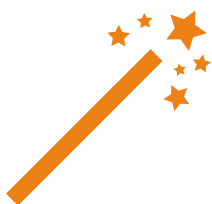
Accessibility Checker - For files that have been remediated to some degree, a feature offered in Foxit PhantomPDF evaluates a PDF's level of compliance, the Accessibility Checker. In just a few clicks, document creators can quickly run a full check on a file to determine whether it meets WCAG 2.0 standards for accessibility. The feature scans through a document's tag structure and produces a detailed report about its degree of accessibility, identifying specific sections requiring remediation. With the full report, users can pinpoint where issues are within a file and how to fix them. The accessibility checker is comprehensive and customizable. In addition to running a full check, users can decide what aspects to check and how the results should be displayed. The accessibility checker saves users a significant amount of time and guesswork from manually verifying a document from top to bottom.

Autotag Document - Users working with PDFs that have little or no accessibility tags will greatly benefit from PhantomPDF's auto-tagging capability. With a click of a button, Autotag Document analyzes an entire PDF and tags each item accordingly. Autotag will categorize each element as a heading, paragraph, figure, list item, table, or form field and apply the appropriate tag. After auto-tagging, a summary report will be provided that shows how elements were tagged. Users have the option to review each tagged item for accuracy. For untagged PDFs or scanned documents, Autotag Document saves users from the time-consuming task of remediating each individual item for accessibility.

Action Wizard Tool - Another way to automate the tagging process within PhantomPDF is by taking advantage of the Action Wizard tool. The Action Wizard differentiates itself from Autotag Document by preparing several key steps beforehand to ensure tag accuracy. Prior to tagging a document, the Action Wizard will prompt the following steps:

1. Add descriptions to the document.
2. Make the document fully searchable (OCR)
3. Convert existing form fields to interactive fields
4. Set the language

Action Wizard uses these steps to best understand how to properly tag the document. Once auto-tagging is complete, the final steps are to add alternative text to all of the document's images and then run the accessibility checker for some minor remediation. The Action Wizard takes a more guided approach towards auto-tagging, minimizing the time and effort normally spent during manual remediation.

Large-scale Remediation - Companies with a backlog of unremediated PDF files can make full use of Foxit's enterprise automation tools. PDF Compressor and Rendition Server provides the same advanced remediation features found in PhantomPDF, but for large volumes of scanned or born-digital documents. These solutions can automatically create tagged PDF files from unstructured, scanned documents as well as structured, electronic records. Both PDF Compressor and Rendition Server maximize the scalability of accessibility compliance.

Foxit is a leading software provider of fast, affordable, and secure PDF solutions. Foxit has over 560 million users and has sold to over 100,000 customers located in more than 200 countries. The company has offices all over the world, including locations in the US, Asia, Europe, and Australia. For more information, please visit https://www.foxit.com.

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