# PDF: Portable document format and the landscape of PDFs

Document authors: Catherine McGowan, Niketa Patel and Marianne Glover.

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This document outlines PDF standards, looks at the advantages, disadvantages, and accessibility challenges associated with each PDF type. It underscores the importance of using a PDF authoring tool for both creating accessible PDFs and amending PDFs generated in other applications. The document highlights the need to test PDFs for accessibility, using a combination of automated tools and human evaluation.

[PDF: Portable document format and the landscape of PDFs 1](#_Toc157782222)

[What is the legal position 3](#_Toc157782223)

[Why has Portable Document Formats (PDFs) got a bad name 3](#_Toc157782224)

[Definitions of PDFs 3](#_Toc157782225)

[Standard / true PDFs 3](#_Toc157782226)

[Scanned PDFs 5](#_Toc157782227)

[Searchable PDFs and OCR 5](#_Toc157782228)

[International Organisation for Standardisation (ISO) PDFs 6](#_Toc157782229)

[PDF/A 6](#_Toc157782230)

[PDF/E 7](#_Toc157782231)

[PDF/X 8](#_Toc157782232)

[PDF/VT 8](#_Toc157782233)

[PDF/UA 9](#_Toc157782234)

[PAdES (PDF Advanced Electronic Signatures) 9](#_Toc157782235)

[PDF Healthcare 10](#_Toc157782236)

[To print, export or save as 10](#_Toc157782237)

[Microsoft Word's built-in PDF conversion may not be robust 10](#_Toc157782238)

[Print to PDF 12](#_Toc157782239)

[Save as Adobe PDF 12](#_Toc157782240)

[Creating accessible PDFs: authoring tools, testing and evaluation 12](#_Toc157782241)

[WCAG Accessibility Techniques 12](#_Toc157782242)

[No source document 13](#_Toc157782243)

[Reflow setting 13](#_Toc157782244)

[Human evaluation subjective issues 14](#_Toc157782245)

[Useful links 14](#_Toc157782246)

## What is the legal position

There is nothing in the law against using PDFs. The law requires all content to be accessible which could be by remediating the PDF or providing a HTML webpage instead of or as well as.

### Remediating

PDF remediation is the process making a PDF accessible which includes tagging elements so it can be read by assistive technology. The tags identify the elements and inform assistive technology the order the PDF is meant to be read.

## Why have Portable Document Formats (PDFs) got a bad name

This negativity is often related to factors such as the way a PDF was created and structured or the original document was saved as a PDF without ensuring accessibility guidelines have been followed.

Also, a factor will stem from the misuse of PDF/A and the use of scanned PDFs without using [Optical Character Recognition (OCR)](#_Searchable_PDFs_and).

It is a common misconception that PDFs cannot be accessible. This is often due to incorrect setup or a lack of awareness regarding the full range of functionalities that an accessible PDF can offer. While there are ways to make PDFs accessible, the reasons for their inaccessibility may stem from factors such as a lack of professional training, technical knowledge, the use of expensive software, and the considerable time required for fixing and testing.

## Definitions of PDFs

### Standard / true PDFs

The PDF was designed for sharing and viewing on the internet. It provides a consistent and reliable way to present information across different platforms web browsers and devices.

Standard PDFs are digital documents made using programs like Word and InDesign, not by scanning physical papers or images.

Standard PDFs support features like text search, copy and paste. When you save a document as a PDF using applications like Microsoft Word and Adobe InDesign, you are creating a standard PDF. These PDFs do not hold to specific ISO standards. However, you can format the PDF to make it accessible.

[Example of a standard / true PDF (opens in a new window)](https://nlsblog.org/wp-content/uploads/2020/06/true-pdf-sample-1.pdf)

ISO standards, such as PDF/A and PDF/X that are designed for specific purposes like archiving or printing. They come with defined sets of rules to meet those objectives. Users need to select the correct option when creating or saving the PDF.

PDF/A is designed for archiving it removes any features not suitable for long term safeguarding. These documents are self-contained so that they remain forever the same and remain unaffected by either software updates or technology advancements. PDF/UA should be the standard for all PDFs hosted on a website. The UA stands for Universal Accessibility and its requirements overlap with WCAG to make it accessible to a range of user needs

Standard PDFs indented for online should always be checked for accessibility in an authoring tool such as Adobe Acrobat Pro.

#### Advantages of PDFs

**Universal compatibility:** PDFs are designed to be platform independent, meaning they can be viewed consistently on different operating systems, devices and software. Standard PDFs maintain backward compatibility, which allows older versions of PDFs to be opened and viewed, regardless of when they were created.

**Preservation of formatting:** PDFs maintain the original formatting of documents, ensuring that the text, images and layout appear as intended by the creator. This is particularly useful for documents with complex formatting, such as brochures, contracts, or presentations.

**Security features:** PDFs can be password-protected, encrypted and have access permissions set. These security features provide control over who can view, edit, or print the document, enhancing document security and confidentiality.

**File size:** PDFs can compress images resulting in smaller file sizes while keeping the quality. This makes PDFs useful for sharing and storing documents without taking up a large amount of storage space.

**Read only nature:** PDFs are typically read only, preventing accidental edits. This ensures that the document remains unchanged during distribution, reducing the risk of accidental changes.

**Interactive elements:** PDFs support interaction such as hyperlinks, forms and multimedia.   
**Easy sharing:** PDFs are easy to share via email, cloud storage, or other digital platforms. They can be opened and viewed using free PDF reader software, making sharing straightforward. **Environmental impact:** The digital nature of PDFs reduces the need for physical printing, contributing to the environment by minimising paper usage and waste.

#### Disadvantages of PDFs in context of accessibility

The main disadvantage is the concept that the PDF will be fully accessible after creating it in an application like Word. Elements such as heading structures or alt text may not added or documents are not saved correctly, which leads to accessibility requirments not being carried over.

#### Document language

Sometimes, when using Microsoft, the default language will be set as 'Match Microsoft Windows [English]'. However, the [English] element does not always get carried over correctly, leading to the language not being recognised by screen readers, leading to ‘Missing Document Language’. The 'Match Microsoft Windows [English]' setting needs to be corrected and set to 'English' in the Microsoft application.

### Scanned PDFs

Scanned PDFs are documents created through the scanning of physical documents using an office scanner or capturing images with a camera. These PDFs mainly consist of ‘images of text’ and not editable text.

Scanned PDFs can use a tool called Optical Character Recognition (OCR) which adds a hidden layer of text. However, OCR is not always accurate so the PDF will need checking using the same guidance lines for all digitally created PDFs.

#### The different scanned PDFs

Simple scans are scanned PDFs where each page is presented as an image, lacking selectable or searchable text. These PDFs are an 'image of text'. Screen readers rely on text-based information, as a result the text within images cannot be read by screen readers.

[Example of simple scanned PDF (opens in a new window)](https://nlsblog.org/wp-content/uploads/2020/06/image-based-pdf-sample.pdf)

Searchable scans are scanned PDFs where each image has hidden text behind it, making the text selectable and searchable. Searchable scans have typically had OCR technology used to extract text from the scanned images. The text is then embedded behind the images in a hidden layer, making it selectable and searchable within the PDF document.

[Example of a searchable scanned PDF (opens in a new window).](https://nlsblog.org/wp-content/uploads/2020/06/made-searchable-pdf-sample.pdf)

#### Scanned PDFs

Scanned PDFs are suitable for situations where preserving the visual appearance of the original document is crucial. The non-editable nature of scanned PDFs ensures the document's integrity as an unmodifiable representation of the original.

From a security view, this non editable feature serves to confirm the document as an unchanged copy.

It is recommended to convert scanned PDFs to a PDF/A, if the PDF is intended to be:

* archival document
* legal document
* printed publication
* historical record
* handwritten note

### Searchable PDFs and OCR

The OCR engine examines characters and the document structure, within the scanned document, creating a text layer beneath the image layer of the PDF. The text layer enables searching, selecting and copying from the document while retaining the visual appearance.

By default, most scanners capture images only. The OCR is often provided as an optional feature in scanning software. Users can choose to apply OCR during or after the scanning process.

#### Disadvantages in searchable PDFs in context of accessibility

It is recommended not to scan documents that are intended to be read online as the OCR may not fully capture the documents content. It is recommended to use the original digital document and not rely on scanned OCR PDFs.

#### Disadvantages with OCR processed PDFs in the context of accessibility

**Accuracy of OCR:** The accuracy of OCR depends on the quality of the original document and the OCR software used. Text and heading structure might not be accurate from the OCR process.

**Loss of formatting:** OCR may not always preserve the original formatting, especially when it comes to complex layouts, fonts, or graphical elements. This loss of formatting can affect the visual structure of the document.

**Handling images and non-text elements:** OCR is designed for text recognition, and it may not handle images or non-text elements well. Graphical content, charts, or illustrations within the document may not be accessible.

**Complex document structures:** OCR might struggle with complex document structures, such as tables, columns, or nested layouts. This could result in challenges when navigating or extracting information.

## International Organisation for Standardisation (ISO) PDFs

PDF/A, PDF/E, PDF/UA, PDF/X and other alternatives are standards that are based on ISO standards. Each PDF has certain requirements and guidelines tailored to different industries.

These standards build upon the core PDF format, adding or restricting features to meet the needs of the intended PDF type. They are specialised versions of the PDF, each serving a set purpose. Users typically start with a standard PDF and then follow the guidelines outlined in the PDF type they want.

### PDF/A

PDF/A is an archival standard for electronic files, focusing on future proofing documents. The PDF/A function is designed for long-term storage. The PDF/A standard prioritises the preservation of the original format and maintains the integrity of document.

PDF/A is valuable in academic, banks, libraries, insurance firms and government bodies where the accuracy of documents are required.

PDF/A incorporates a restricted set of features that excludes JavaScript, audio and video content and encryption. This limitation ensures accurate viewing of the archived documents in the future.

#### PDF/A Versions:

**PDF/A-1** - ISO Standard: ISO 19005-1:2005. Designed for the long term archiving of electronic documents. It restricts features that are not suitable for archival preservation, such as encryption.

**PDF/A-2** - ISO Standard: ISO 19005-2:2011**.** Introduces additional features and improves support for embedded files and comments while maintaining the focus on long term archiving.

**PDF/A-3 -** ISO Standard: ISO 19005-3:2012. Allows embedding of any file format providing more flexibility for including additional data.

The blog post [How do you tell the PDF/A variants apart (opens in a new window)](https://www.callassoftware.com/en/blog/making-pdf-a-conversion-easier) will help you understand the differences between each PDF/A variant and guide you on when to use them.

#### Use PDF/A if the PDF is:

* a historical document, such as old manuscripts, handwritten notes, sketches, or paper records
* a legal contract, agreement or official document that requires a verifiable and unalterable representation
* a printed publication, such as a book or newspaper, requires the preservation of the original layout, fonts and images
* a government record, historical map, or other records where the content is as important to keep and not altered

#### Disadvantages relating to accessibility with PDF/A file

The content within a PDF/A-1 are most likely to be inaccessible. The PDF/A-1 is designed for long-term archiving and they aim to ensure documents can be reliably preserved and accessed in the future. Later versions of the PDF/A standard (PDF/A-2 or PDF/A-3) offer more flexibility and support for certain interactive and accessibility features while still maintaining the principles of long term archiving.  
**Document Security Restrictions:** Security features in PDF/A files, such as password protection or restrictions on copying text, can potentially hinder accessibility.

**File Size and Loading Time:** Large PDF/A files may take longer to load, affecting the user experience, especially for individuals with slower internet connections or limited bandwidth.

### PDF/E

The PDF/E is used for the exchange and archiving of engineering documents and tailored for engineering applications. It integrates into engineering workflows, catering to the requirements of professionals in fields such as engineering, architecture and construction. It extends to accommodating both 2D and 3D drawings commonly used in technical workflows.

It can rotate and fold 3D objects on-screen, providing engineers with a valuable tool for working with complex and detailed models. PDF/E is also used in sharing, printing and archiving engineering documents, ensuring standardised formats.  
**PDF/E** ISO Standard: ISO 24517-1:2008 (PDF/E-1)

#### Disadvantages relating to accessibility with PDF/E files

Creating PDF/E files requires keeping to specific standards. The complexity of these standards can make it more challenging to navigate and interact with for users of assistive technologies.. Users may encounter difficulties in ensuring proper tagging and structure to meet accessibility guidelines. PDF/E files are most likely to be inaccessible.

### PDF/X

PDF/X is designed for creating print ready documents, catering to professionals in the printing industry, graphic designers and creative experts. It ensures that documents are prepared for high quality, professional grade printing by correctly embedding fonts, images, colour profiles and other essential elements.

PDF/X plays a role in the printing workflow. PDF/X is instrumental in ensuring that files meet specific standards for reliable reproduction in the print industry. It is used in various printing processes, from pre-press, to press and post press.

#### PDF/X Versions:

**PDF/X-1a:** ISO Standard: ISO 15930-1:2001. Designed for the graphic arts and printing industry, ensuring reliable and consistent colour reproduction.

**PDF/X-3:** ISO Standard: ISO 15930-3:2002. Provides greater flexibility in colour representation by allowing colour management information to be included in the file, enhancing support for colour workflows.

**PDF/X-4:** ISO Standard: ISO 15930-7:2010. Offers enhancements over PDF/X-3 by allowing the use of transparency, layers and colour. It allows more advanced graphic workflows.

**PDF/X-5:** ISO Standard: ISO 15930-8:2010. Designed for data exchange in the packaging and label printing industry. It allows for the use of live transparency and layers, supporting complex graphic content.

#### Disadvantage relating to accessibility with PDF/X files

It is important to note that PDF/X is not intended for online distribution but for print. If accessibility is a primary concern, explore alternative formats such as a standard PDF or PDF/UA.

### PDF/VT

PDF/VT is a specialised standard coming from PDF/X and used for variable data printing, digital printing and transactional printing, ensuring reliable exchange of variable data print jobs.

The key features come from PDF/X standard and used to optimise the variable data printing where certain elements can be different on each page. The ability to efficiently modify data elements like text and graphics without compromising printing speed.

PDF/VT preserves colour profiles, layers and transparency in documents. It is suitable for maintaining the visual integrity of customised printing materials. Common applications include printing bank statements, invoices and personalised marketing content.  
  
**PDF/VT:** ISO Standard:ISO 16612-2:2010 (PDF/VT-2)

#### Disadvantages relating to accessibility with PDF/VT files

The PDF/VT is intended for printing and customisation, rather than online distribution.

If accessibility is a primary concern, consider alternative formats such as PDF/UA.

### PDF/UA

The PDF/UA standard is designed to ensure unrestricted access for people with disabilities.

It is compatible with assistive technology, speech recognition software, eye tracking systems, allowing reading and navigation.

The PDF/UA will need a full accessible check undertaken in the authoring tool.

**PDF/UA:** ISO Standard: ISO 14289-1:2014 (PDF/UA-1)

#### Disadvantages relating to accessibility with PDF/UA file

The challenges associated with adopting PDF/UA encompass:

* tool requirements and limitations of certain software tools
* correct software tools can be expensive
* user familiarity and a learning curve, in adopting new tools
* time consuming and resource intensive, particularly for organisations dealing with a substantial volume of legacy content conversion

### PAdES (PDF Advanced Electronic Signatures)

PAdES will be used if a PDF document requires a digital signature with advanced characteristics (such as legal validity, authentication and integrity). PAdES provides a framework for ensuring that the electronic signature meets specific criteria for legality and security within the context of a PDF file.

**PAdES:** ISO Standard:ISO 32000-1:2008 (PDF 1.7), ETSI EN 319 142 (PAdES)

#### Disadvantages relating to accessibility with PAdES files

PAdES itself does not hinder accessibility features but it is essential to ensure that the electronic signature dose not impact the accessibility of the PDF. Testing with different assistive technologies, including screen readers, is crucial to validate accessibility.

### PDF Healthcare

PDF Healthcare represents the application of PDF standards within the healthcare sector, aiming to secure and manage health information effectively.

This standard provides best practices and guidelines for capturing, exchanging, preserving and safeguarding healthcare data. Designed to accommodate healthcare information like personal documents, XML data, images, clinical notes, lab reports, electronic forms, scanned images, photographs, digital X-rays and ECGs.

Its purpose is to establish standards that emphasis security for the healthcare industry.

**PDF Healthcare:** ISO Standard:ISO 27799:2016 (Health informatics — Information security management in health using ISO/IEC 27002)

#### Disadvantages relating to accessibility with PDF Healthcare files

Healthcare PDFs can pose a challenge through updates of documents. Regular updates may see inconsistencies in accessibility standards.

Other challenges may come from:

* complex document structures
* forms with interactive elements
* privacy concerns related to securing sensitive information
* integration of multimedia content without proper descriptions

## To print, export or save as

All the actions, print, export and save as, give different results when working with a Word document and converting it to a PDF.

### Microsoft Word's built-in PDF conversion may not be robust

When you save or export a PDF from Word some issues can arise which can impact accessibility. Make sure the source document is accessible with correct heading structure etc. then follow this process to save as a PDF.

**Note:** there will differences found with these instructions, which will relate to devices, different software versions and restrictions you may have.

For more control, over critical documents use a dedicated PDF authoring tools like Adobe Acrobat.

To save Word document as a PDF:

1. Go to the **File** tab.
2. Select Save as
3. Select More options.
4. Select **PDF** for ‘save as type’.
5. Select Options.
6. Make sure the boxes checked are:
   * + all pages range
     + publish document.
     + create bookmarks using headings
     + document properties
     + document structure tags for accessibility
     + bitmap text when fonts may not be embedded
7. Select **Ok** then **Save**.

#### Word documents to PDF

It is recommended to perform a full accessibility review of the PDF.  
Issues that may arise during the conversion process include:

* nested tables or multiple text boxes may create challenges with reading order
* reading order may not be preserved, affecting the logical structure of the document
* alt text for images may not always be accurate
* interactive elements such as forms or hyperlinks may not be fully supported
* headings and styles may not always be accurate, impacting the hierarchical structure of the document
* fonts used may not be embedded properly, leading to display issues on different systems
* tables may not be appropriately tagged, potentially hindering accessibility
* lists and bullet points may not always be converted correctly
* lists over 2 pages will be saves as 2 separate lists
* bookmarks and links may not be translated into actionable links, affecting document navigation
* table of contents may also be inaccurate

### Print to PDF

When you print to PDF, the resulting file is often flattened, converting dynamic or interactive elements into a static representation like an image. The final document appears similar to a hard copy. The decision to print to PDF depends on the needs of the document, especially if preserving interactive elements is crucial. Alternative methods, such as saving or exporting as PDF without flattening, may be more appropriate in those cases.

### Save as Adobe PDF

Save as PDF in different software can vary depending on the software. Typically, this would be used when already working with a PDF editor.

The term "Export" is commonly associated with creating files in various formats beyond the default format of the application. It is frequently used when converting or saving documents into specialised file types for further use or sharing.  
  
Save as Adobe PDF is likely to be a more feature rich option, especially if you are using Adobe Acrobat Pro. It gives you greater control over the PDF creation process. This option may only be available if you have Adobe Acrobat Pro

[KOFAX Difference Between Print to PDF, Save to PDF and Export to PDF (opens in a new window)](https://www.kofax.com/eg/power-pdf/difference-between-print-save-and-export-to-pdf#:~:text=Printing%20to%20PDF%20flattens%20files,hard%2Dcopy%20or%20printed%20format.).

## Creating accessible PDFs: authoring tools, testing and evaluation

Making the source document accessible beforehand and saving it correctly will lead to less work and save a lot of time. Therefore, it is recommended to build a document that will be a PDF in authoring tools, like Adobe Acrobat Pro. Making PDFs accessible requires a substantial amount of effort, but there are many paid-for and free courses available to help with training.

Some of the most frequently used resources include AbilityNet, TaggedPDF and WCAG Accessibility Techniques.

### WCAG Accessibility Techniques

WCAG Accessibility Techniques can be useful as they explain the criteria that requires to be fulfilled and how to do that. Some of the most important aspects of an accessible PDF to get right are Tags, reading order, table scope and headings, titles, heading hierarchy, descriptive links, colour contrast and alt text for images. Achieving accessibility goes beyond this list, considering technical, design, and content aspects. It should be noted there a lot more checks that are required like using assistive technology, reflow, language, embedded fonts, placement, bounding boxes etc.

Given the diverse array of accessibility needs, **it is recommended not to label anything as 'fully accessible.'** A document fully WCAG compliant and usable by most is not the same as fully accessible. If a document claims to be fully accessible, it implies that all users are able to use it. However, in reality, individuals who might need alternative formats, such as a Braille version, might be discouraged from requesting a different version. This could make them feel overlooked or excluded, as their unique accessibility requirements may not be acknowledged or addressed.

No source document   
If there is no access to the source document of the PDF, there is software on the market that could be used, such as CommonLook or Foxit PDF Editor. However, when it comes to tagging, Adobe Acrobat Pro stands out as the best option to ensure accessibility. One of the key reasons is the access to the Tag tree, as all tagging needs to be checked manually.

**Adobe Acrobat Pro Tags tree** – is a tags panel that contains a tree like list of all the document content. The tags tree shows the structure elements of the page and in the order the screen reader should read it. If any content is not in the tags tree it will not be accessible to the screen reader.

When it comes to testing, a range of tools can be employed. For automatic checks, use Adobe Acrobat Pro Accessibility Checker and PDF Accessibility Checker (PAC) 2024. All the accessibility issues found are relevant and should be fixed.

For manual checks, follow WCAG standards, there is a check list online that can be used from Digital A11Y [WCAG 2.1 and 2.2 AA Checklist: A Guide to Web Accessibility (opens in a new window)](https://www.digitala11y.com/wcag-checklist/#:~:text=This%20ultimate%20WCAG%202.1%20Checklist,and%20organizations%20need%20to%20follow.) this for web so maybe better to link to this: <https://accessibility.pearson.com/training/documents/checklists/pdf/index.php> or similar

The human evaluation remains crucial for a complete assessment and is essential to ensure that accessibility is addressed. Use the reflow setting, zoom/magnify and a colour contrast analyser. It is advisable to check with assistive technologies such as NVDA, JAWS, etc.

### Reflow setting

The "reflow setting" in the context of accessibility, typically refers to a feature in PDF documents that allows content to be reorganised and reflowed to fit the screen or viewport. This is particularly important for users with visual impairments or those who use assistive technologies to access digital content.

When a PDF document is created with accessibility in mind, the reflow setting ensures that the text and other content can adapt to different screen sizes and orientations. This can be helpful for users who may need to enlarge text, navigate through content using assistive technologies, or view the document on various devices.

In practical terms, enabling the reflow setting allows the content of a PDF to be presented in a linear, easily readable format, often with a single column of text that adjusts to the width of the screen. This is in contrast to a fixed layout, which might not be as user-friendly for individuals with certain accessibility needs.

Users can activate the reflow setting in their PDF viewer and it's particularly useful when reading PDFs on smaller screens, such as those on mobile devices. Additionally, it aids in ensuring that the content remains accessible and clear when zoomed in or viewed using assistive technologies.

### Human evaluation subjective issues

**Overall user experience:** Accessibility is not just about meeting technical criteria but ensuring that individuals with diverse needs can effectively use and understand the content. Human evaluators can provide insights into the overall user experience, considering the needs of different user groups.

**Colour contrast:** Automated tools can analyse the colour values of text and background to determine if there is sufficient contrast. A human may need to verify this.

**Reading order:** Automated tools can analyse the logical reading order of content within a PDF. A human evaluation is crucial to ensure that the reading order makes logical sense in the context of the content.

**Tags tree:** Human evaluation is needed to make sure elements are correctly tagged and in the right order.

**Alternative text for images:** Automated tools can flag images without alternative text. A human reviewer is essential for providing meaningful and contextually relevant descriptions for images or to make a judgement, to mark the image as decorative

**Interactive elements:** Automated tools can check for missing or incorrect labelling of interactive elements. A human evaluation is necessary to assess the clarity and context of interactive elements

**Language and readability:** Assessing language, its complexity, readability and changing to plain language principles, requires a human judgement.

**Forms and tables:** While automated tools can catch structural issues, a human reviewer is essential for ensuring that the structure enhances accessibility and usability.

**Audio and video content:** While automated tools can identify the absence of captions or transcripts, human evaluation is needed to verify the quality and accuracy of these alternatives.

**Contextual understanding:** Human evaluation can consider the specific context of the document and its intended audience. They can make decisions based on the unique characteristics of the content that automated tools may not fully capture.

## Useful links

[Word to PDF and PDF accessibility guide PDF (opens in a new window)](https://www.ucop.edu/information-technology-services/_files/word-pdf-accessibility-guide.pdf)

[Easily convert a PDF to HTML (opens in a new window)](https://www.adobe.com/acrobat/hub/how-to-convert-pdf-to-html.html)

[Create and verify PDF accessibility (Acrobat Pro) (opens in a new window)](https://helpx.adobe.com/uk/acrobat/using/create-verify-pdf-accessibility.html)

[Adobe PDF File types - specialist formats and what they’re used for (opens in a new window)](https://www.adobe.com/uk/acrobat/resources/document-files/pdf-types.html)

[Searchable PDFs (opens in a new window)](https://pdf.abbyy.com/learning-center/pdf-types/)

[Casedo - Scanned PDFs (opens in new window)](https://www.casedo.com/insights/optical-character-recognition/convert-pdf-to-text-on-the-fly-with-ocr/)

[PDF Techniques for WCAG 2.0 (opens in a new window)](https://www.w3.org/TR/WCAG20-TECHS/pdf)

[WCAG or PDF/UA: what’s the difference (opens in a new window)](https://pdfa.org/wp-content/uploads/2021/06/Boris-Doubrov-WCAG-or-PDF.pdf)

[Accessibility of Office Documents and Office Applications (opens in a new window)](https://adod.idrc.ocadu.ca/node/1)

[PDF Accessibility Remediation Software Tools: A Detailed Comparison (opens in a new window)](https://allyant.com/pdf-accessibility-remediation-software-tools-review-detailed-comparison/#:~:text=Adobe%20Acrobat%20Pro%20DC%20was,fully%20accessible%20and%20standards%2Dcompliant.)

[Setting Microsoft Office 365 Language (opens in a new window)](https://digi-ed.uk/support/article/setting-microsoft-office-365-language/)

[Creating bookmarks in PDF documents (opens in a new window)](https://www.w3.org/WAI/WCAG22/Techniques/pdf/PDF2)