TECHNISCHE UNIVERSITÄT DRESDEN

Accessible Documents

How to create accessible PDF documents with Word

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Contact

TU Dresden, Faculty of Computer Science, Chair of Human-Computer Interaction (HCI)

TU Dresden, Directorate 7

Emma Müller, M. Sc.
✉ emma_franziska.mueller@tu-dresden.de

Jens Voegler, M. Sc.
✉ jens.voegler@tu-dresden.de

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1 Content

2 Introduction

Nowadays, universal and unrestricted access to documents has become commonplace. In particular, PDF documents can be created quickly and easily, they look the same everywhere and can be read by any device. Whether for the distribution of printed material or forms: PDF documents are used extensively everywhere to provide various contents.

Not everyone can benefit from this natural access. Especially people with disabilities are often confronted with inaccessible PDF documents. An example: without appropriate precautions, a blind person cannot read a scanned copy, even if it has been converted into PDF format.

With the Act on Equal Opportunities for People with Disabilities[1] and the BITV 2.0[2], respectively, public bodies are also legally obliged to make digital offerings accessible.

On the following pages we would like to give you instructions on how to make your documents accessible to more people. Furthermore, your work should become more effective and efficient in the long term.

The instructions focus on *Word 2016* om Windows, *Word 2019* on Windows and macOS. A guide for *Word 2013* and *2007* can be found in previous editions of this brochure[3]. Of course, you can use the concepts, support and tips presented here regardless of which version of *Word* you are using.

[1] Act on the Equality of People with Disabilities (German)

[2] Accessible Information Technology Regulation (as of 2019) (German)

[3] Instructions for the Accessible Design of Documents

3 Basic Principles

First, we will look at some basic aspects of accessibility. You can skip this section and go directly to the guide (page 15 onwards) if you are already familiar with the basics. The guide is deliberately kept clear and simple with examples and pictures.

3.1 Visual Barriers

Documents that cause problems for people with visual or other disabilities are quickly created without appropriate knowledge. However, in this guide we are talking primarily about blind people or people with visual impairments. The latter is not only the most common limitation when working with a computer, but also the one with the most varied characteristics. What both groups have in common is that purely visual information cannot be perceived or can only be partially perceived.

Sighted people distinguish headings from other text visually, blind people purely structurally by being informed that it is a heading. This is also the case with many other text elements, such as paragraphs, lists, references, tables and directories. Moreover, blind people explore a document sequentially, so the reading order must be logical.

People with a visual impairment can usually only perceive information visually to a limited extent. They often need support in the form of enlargement or increased contrast.

3.2 Introduction of PDF/UA

Digital documents can be distributed and spread easily, reliably and in original form with the *Portable Document Format* (PDF). Originally, the format was designed to preserve the print-like, visual impression rather than to preserve the meaning and structure of the underlying content. This creates barriers for readers, who are dependent on digital accessibility of the content.

The document's contents can be structured, completed or extended in the PDF by means of appropriate labelling. This enables readers who are not or not exclusively interested in visual expression to fully understand the content and use it independently.

This is done by inserting so-called tags into the document. These are standard elements - such as headings, lists or paragraphs – which provide an indication of the included content or its function. These tags can then be used by assistive technologies, e. g. screen readers, to output and prepare the document content.

In order to give unrestricted access to PDF documents to as many people as possible, the global standard ISO 14289-1, better known as PDF/UA, was developed in 2012. UA stands for *Universal Accessibility*.

The standard focuses on the technical aspects and does not contain any instructions for the practical application of the required measures and possibilities. The support of the standard is supposed to ensure that PDF - creating programs can create partly accessible or even accessible documents without requiring special knowledge of the users.

The following conditions for PDF/UA compliant documents are defined:

- Significant content must be separated from decorative elements (artifacts) and must be marked as such.
- The meaningful elements must be arranged in a structure tree and reflect the relationships to each other (e. g. groupings, etc.).
- This structure tree should reflect the logical reading order of the document.
- Information must not only be conveyed by purely visual characteristics. Therefore, pictures and graphics must also be provided with alternative textual descriptions.
- Navigation within the document must be made possible.

The ***PDF/A*** standard, which many applications support, has nothing to do with *Accessibility*, but stands for *PDF Archive* and is supposed to enable the long-term storage of documents. The so-called *Tagged PDF* can be seen as a previous version of PDF, which itself is not an ISO standard.

4 Structure of Word

The *Word* application window is divided into five areas: the ribbon, two sidebars, the document preview, and the status bar. In macOS the menu bar is also relevant.

The specific structure in Windows is shown in Figure 1 whereas Figure 2 shows the structure in macOS. Under both operating systems the focus can be changed between the areas with the F6 key.

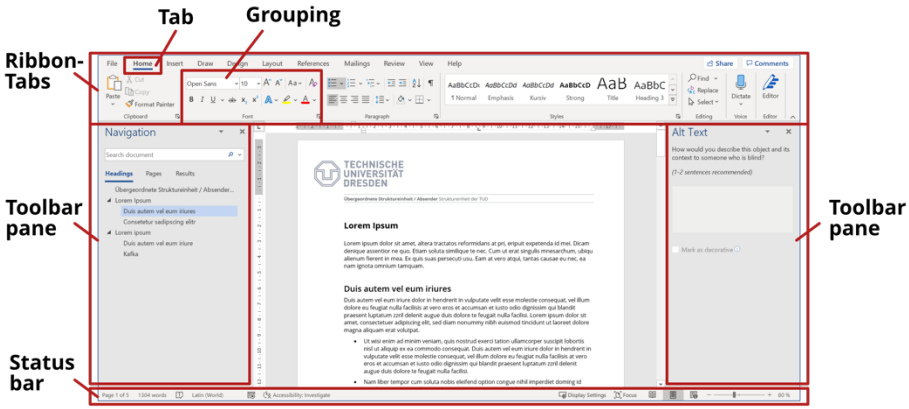

Figure 1 Structure of the Word application window in Windows

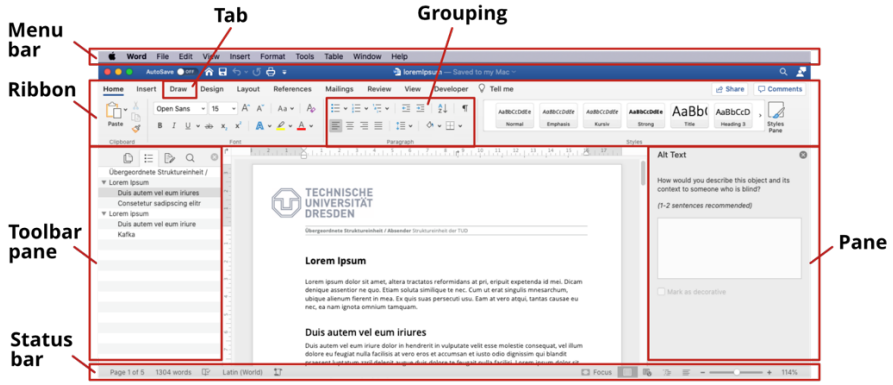

Figure 2 Structure of the Word application window in macOS

4.1 Ribbon and Menu Bar

The **ribbon** contains the **tabs** Home, Insert, Draw, Draft, Layout, References, Review and View. In Windows there is also the File tab, which can be found in the **menu bar** in macOS. Furthermore, additional tabs are displayed when tables, objects or images are selected. Depending on your settings and installed Add-ins, additional tabs may be available.

Below the horizontally arranged tabs there is the sub-menu of the currently active tab. Figure 1 and Figure 2 show the submenu of the Home tab. The menu items are arranged in **groupings**.

4.2 Status Bar

The **status bar** displays information such as the document's current page and its total number of pages and words. The language can also be changed here.

4.3 Sidebars

Depending on which operating system you use, the content of a sidebar is called either pane (macOS) or toolbar pane (Windows). The term **toolbar** is used in these instructions.

In contrast to the ribbon and the status bar, the side bars must be opened actively. The toolbar for navigation - the **navigation bar** - is the only one that is displayed in the left sidebar of the application window. All other toolbars are opened in tabs in the right sidebar.

4.4 Context Menu

Some *Word* functions can be accessed via the **context menu** of a selected object. You can open the context menu by right-clicking on a word, picture or table. Alternatively, you can select the corresponding object and open the context menu by simultaneously pressing the Shift key ⇧ and the F10 key.

4.5 Keyboard Control

In general, *Word* can also be operated with the keyboard only. Therefore, in some places in this manual, possible key combinations are suggested to you as an alternative way of controlling *Word*. The key combinations in Windows differ from those in macOS.

Press the specified keys simultaneously. The symbol of the operating system (Windows: , macOS:) next to the key combination indicates to which operating system it belongs. However, these symbols primarily show that the described procedure belongs to the operating system.

5 Structure of the Document

In the introduction it has become clear that when creating documents, content should not only be prepared in a purely visual way, but a semantic meaning should also be assigned to the individual elements. This works best with the predefined **styles**. These are templates for headings, paragraphs, lists, tables, etc.

If you assign the style sheet Heading to a text, it is automatically given a uniform appearance. In addition, this text will actually have the appropriate meaning, which can be read by assistive technologies.

By using style sheets for your text elements, you have a solid basis for your accessible document. Each document has standard style sheets for the individual text elements, which you can adapt to your individual visual preferences. How you can adapt style sheets for your documents has already been documented several times[4] and should not be part of these instructions.

This grouping of the ribbon contains the Quick Styles list (Figure 3), which shows a part of all available styles. When you open the **Styles** toolbar, a list of all templates available in the document appears (Figure 4 and Figure 5).

To apply a style sheet to a text passage or heading, mark the text and select the desired style sheet.

Tab **Home** ⟶ Grouping **Styles**

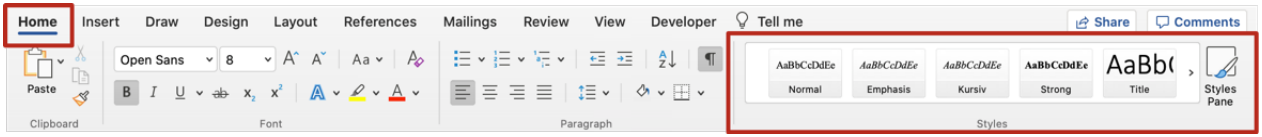

Figure 3 Grouping Styles under the Home tab

[4] Costumize or Create New Style Sheets

Grouping **Styles** ⟶ **Styles...** (symbol at bottom right)

Ctrl Alt ⇧ S

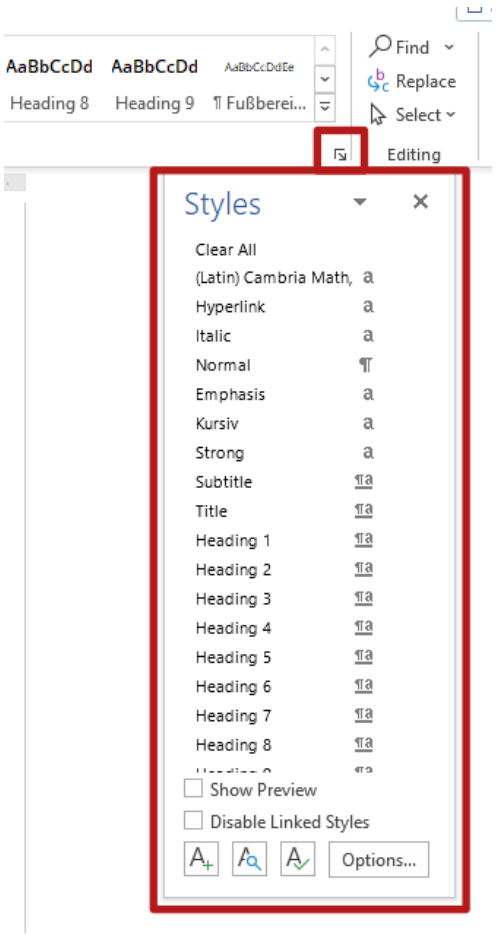

Figure 4 Detailed View of the Style Sheets in Windows

Grouping **Styles** ⟶ **Styles Pane** ⌘ ⌥ ⇧ S

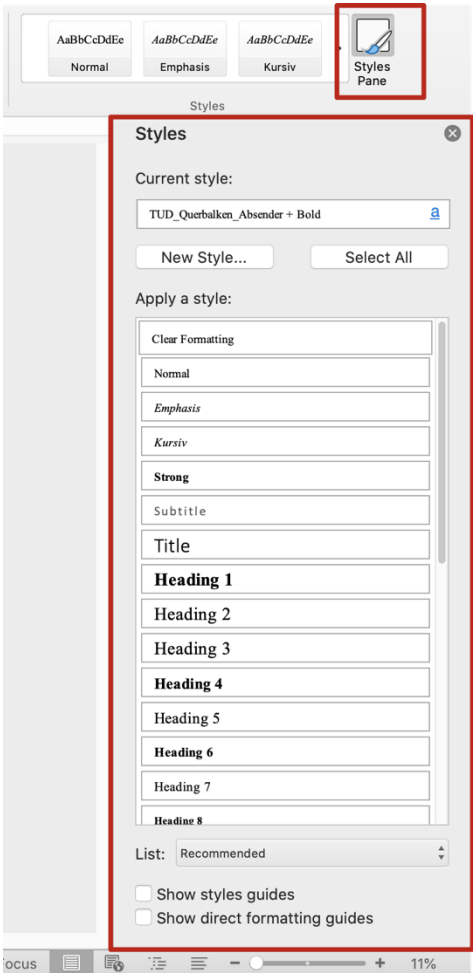

Figure 5 Detailed View of the Style sheets in macOS

5.1 Outline and Navigation View

Word offers you different views to help you work on your document. In addition to the standard view Print Layout, the **Outline** view is the most useful for our purposes (Figure 6). In this view you can check what is really relevant for your accessible document: ***the logical and well-structured layout***.

Knowing about this structure helps blind people to recognise the correlations in the document - which is what sighted people grasp purely visually.

In Figure 7, the document starts with a heading (level 1), followed by a text section (text level). It is followed by another heading (level 2) and a bulleted list (text level). The hierarchies of the headings and texts are recognizable.

Tab **View** ⟶ Grouping **Views** ⟶ **Outline**

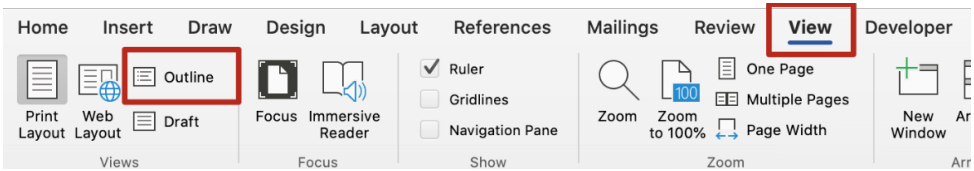

Figure 6 Activate Outline view via the ribbon

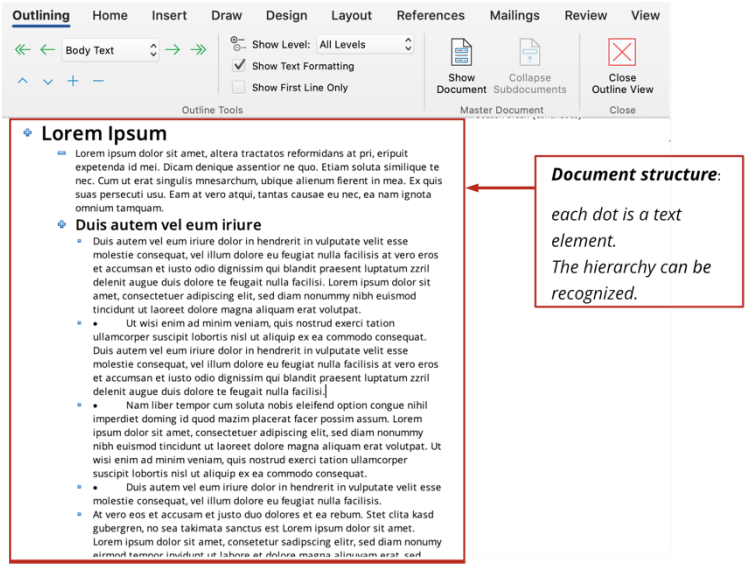

Figure 7 Outline View

The markings assigned to the individual elements are not intuitively evident. Therefore, it is necessary to select the corresponding text element. In the Outline Tools the current level of the element, for example level 2 for heading 2, can not only be read but also adjusted (Figure 8).

This opens the **Navigation Pane** on the left-hand side of the application window. In macOS the thumbnail view, which shows thumbnails of the pages, is opened first. Selecting the second tab of the toolbar (list icon) the navigation by headings is opened as visualised in Figure 9. In Windows this view is shown immediately. The navigation view allows you to check that the headings are correctly marked and nested.

This area allows exactly what the correct marking of headings with style sheets should be used for - navigation in the document and jumping easily between sections using structure elements.

Tab Outlining ⟶ Grouping Outline Tools

Figure 8 Change Outline Levels over the Outline View

Tab **View** ⟶ Grouping **Show** ⟶ **Navigation Pane**

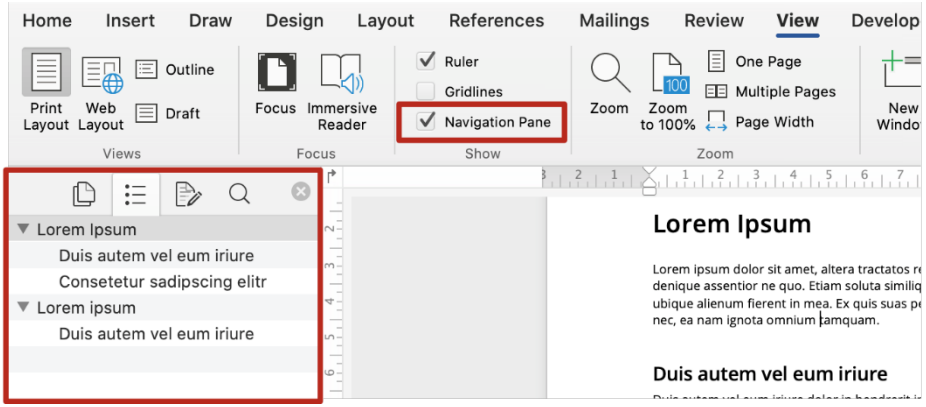

Figure 9 Navigation Pane

6 Guideline

In this section you will find practical guidelines on how to turn your *Word* document into an accessible PDF. The guideline covers essential steps that you should follow when creating an accessible document: Set **Document Properties**, perform **Word Processing** and **Image Description**, **Creating a PDF** Document and **review** it.

Following the guideline does not automatically guarantee a PDF document that is accessible in any case. This requires further specific checks, e. g. with *Adobe Acrobat DC*. Moreover, the quality of your documents is highly dependent on the conversion tool used. However, with this guide you will learn the necessary steps to prepare accessible documents in *Word*.

General Note: *Word* adjusts the display and positioning of individual menu items to the size of your monitor or the set window size. It is therefore possible that the functions described are located in other positions than those shown here or that you must first actively *open* an additional area before you can find the function.

If there are differences in the process between *Word* om Windows and *Word* om macOS, these are described separately. Otherwise, the described procedure applies to both operating systems. This is also indicated by the corresponding symbols: for Windows and for macOS.

6.1 Document Properties

The first step to an accessible document is to describe the general features of your document. Add a document title to your document and check the document language used.

6.1.1 Document Title

If your document has a title, it will later appear as the window title of your PDF document. People who depend on speech output will have the window title read out and therefore know which document it is.

Setting the document title is different on Windows compared to macOS. Figure 10 and Figure 11 show you how to set the title in macOS, Figure 12 and Figure 13 show you the procedure in Windows.

Enter all meta information about the document here. Apart from the title, you can also add further, more detailed information about your document. However, the title is the most important factor for accessibility.

Menu bar **File ⟶ Properties ⟶ Summary**

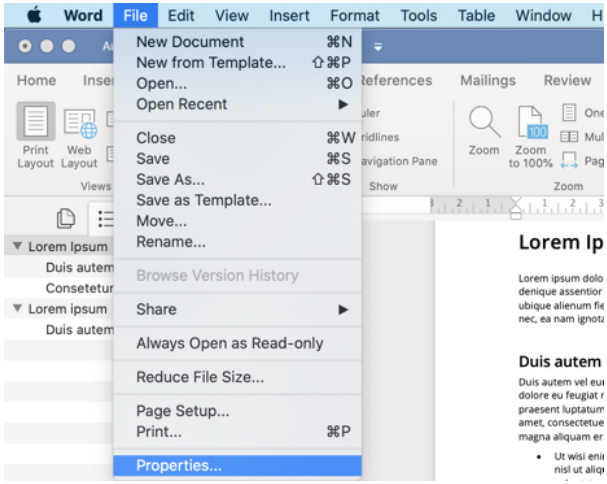

Figure 10 Position of the Menu Entry Properties in the Ribbon of Word on macOS

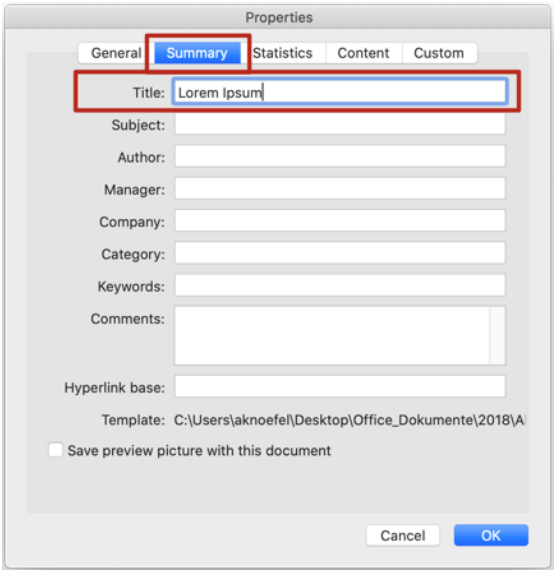

Figure 11 Setting a title in the Document Properties on macOS

Tab **File** ⟶ **Info** ⟶ **Properties** ⟶ **Title**

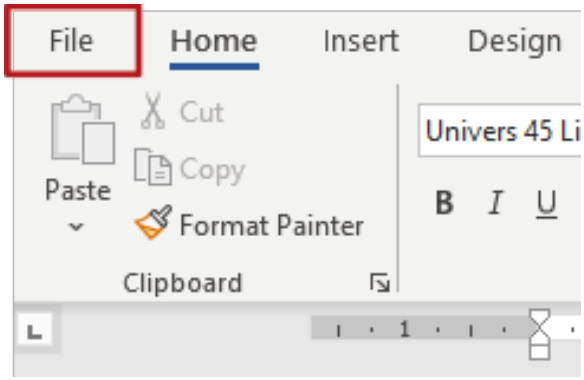

Figure 12 Position of the Tab File in the Ribbon of Word on Windows

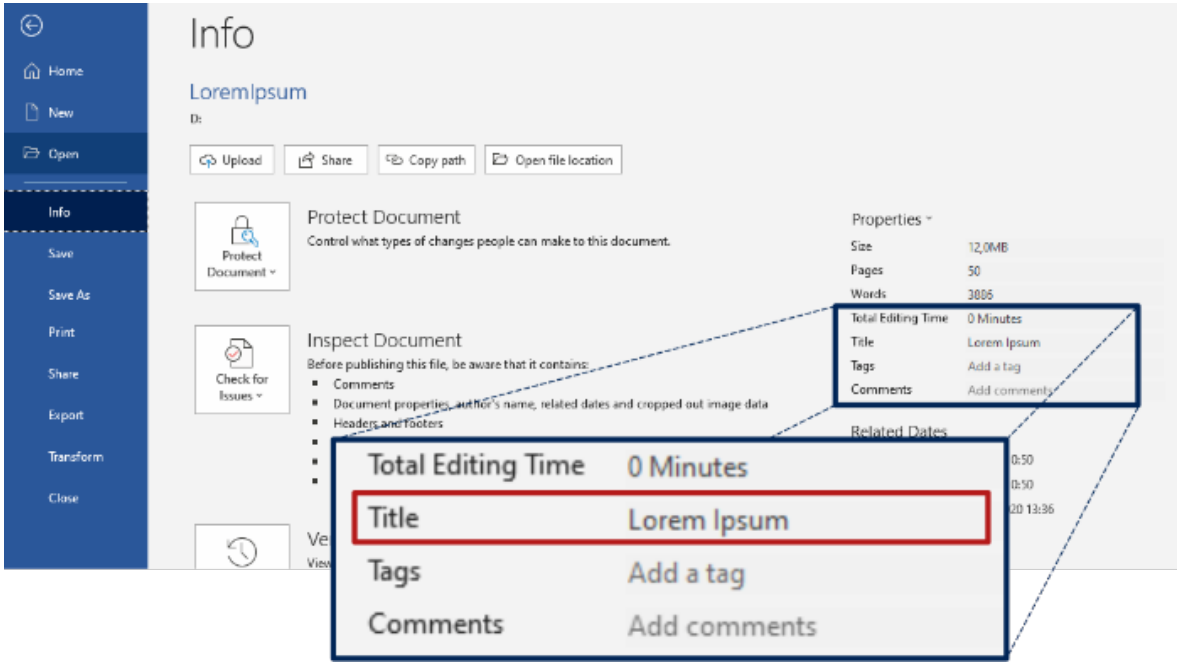

Figure 13 Setting a Title in the Document Properties on Windows

6.1.2 Document Language

Every *Word* document has a basic language in which it is written. This property is particularly relevant for people who use a speech output. In *Word*, you can check and change the language of the document as shown in Figure 14.

If your document has paragraphs or individual words that differ from your specified basic language, you should change the language for these, otherwise they will not be correctly reproduced by the speech output. Therefore, mark the desired text and proceed as described above.

6.2 Word Processing

After these preparations you can get down to the real work: creating the content.

6.2.1 Notes on Design

All visual characteristics of texts (font size, font colour, spacing, paragraphs etc.) should be organised in style sheets. Avoid positioning text using spaces and lines.

Suppose you use a blank line after each headline to create a visual distinction from the following text. For readers who use speech output, exactly this blank line is read out as blank. This may still be acceptable for a single blank line, but if, for example, instead of a page break, 20 blank lines are inserted by pressing Enter to obtain a blank page, the document is no longer accessible.

Tab Review ⟶ **Grouping Language** ⟶ **Language** ⟶ **set proofing language**

Or: Status bar ⟶ Select **Language**

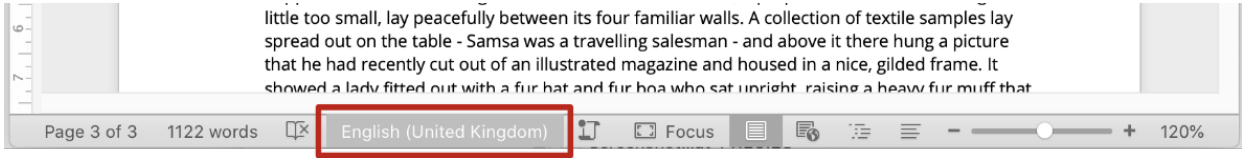

Figure 14 Language Setting in the Status Bar

You can check your document for existing spaces and lines by displaying the paragraph marks (Figure 15).

Avoid manual or automatic word division in your document. When converting your document to PDF these are usually not implemented correctly.

Relevant information should not only be written in headers or footers, as these are not tagged.

in Word 2016 and older versions, footers will not be indexed correctly during PDF export. This must be corrected after exporting with a PDF editing program such as *Adobe Acrobat DC*.

Furthermore, several columns should always be converted by using the designated *Word* function (Figure 16).

Tab **Home** ⟶ Grouping **Paragraph** ⟶ **Show/Hide Paragraph Marks ¶**

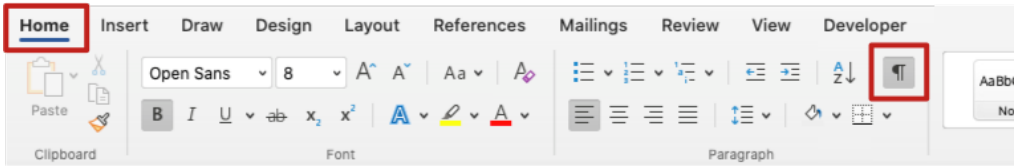

Figure 15 Show/Hide Paragraph Marks

Tab **Layout** ⟶ Grouping **Page Setup** ⟶ Columns

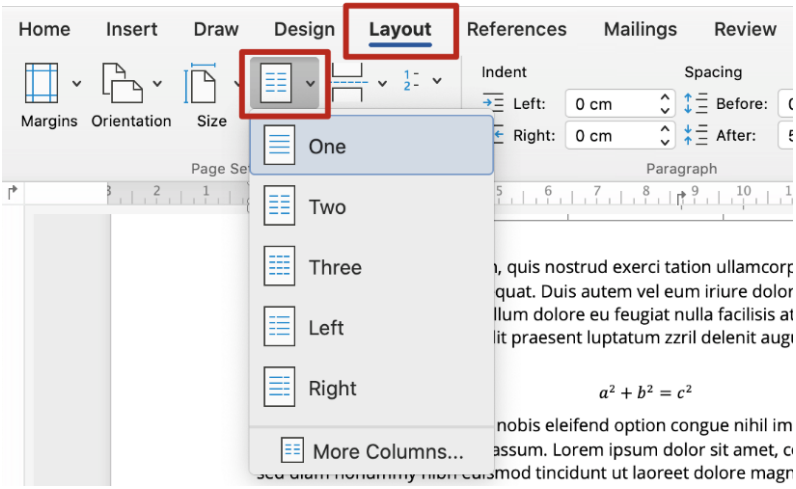

Figure 16 Insert several columns

If you use a separate text field (Shape) to highlight information, it is usually visually related to neighbouring text or images. To depict this relationship structurally, you must ensure that the corresponding anchor is placed in the correct position (Figure 17). Therefore, drag the anchor symbol, which appears when you select the text field, to the paragraph to which the text field belongs. The content of the text field will then occur in the reading order after the text of this paragraph.

Please note that the frame of the text field is marked as an image element when it is converted into a PDF document and you should therefore either give the text field an alternative text or mark it as decorative (see page 33).

If the anchor does not appear on your screen, use the Home tab to display the paragraph marks as described on the previous page.

Make sure that for all illustrations the anchor is set to the correct position or that the Wrap Text Option **In Line With Text** is selected (Figure 18) so that the reading order of elements corresponds to the optical reading order when converting to PDF.

If you place the anchor of a text field next to an Illustration, which is located in a line as described above, the text field will be read out before the illustration. To avoid this, you can give the illustration a label and drag the anchor of the text field into the line of the label.

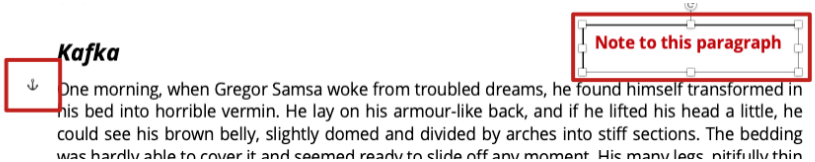

Figure 17 Anchor of a Text Field

Select image ⟶ open **context menu** ⟶ **Wrap Text** ⟶ **In Line with Text**

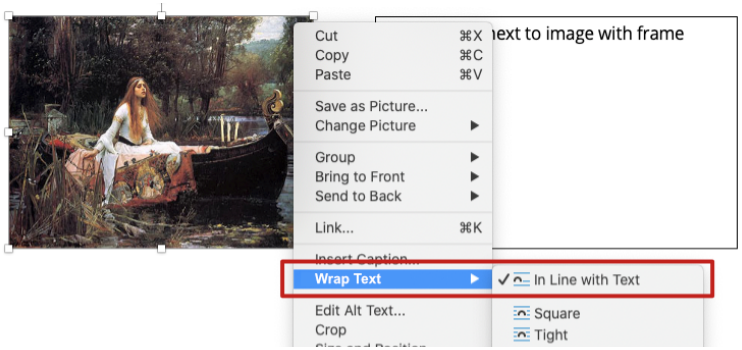

Figure 18 Setting the Line Break via the context menu of an Image

Design your texts by consciously using the following elements:

- Headings
- Paragraphs
- Lists
- Links and Cross References
- Registers
- Tables
- Images and Graphics

6.2.2 Headings

In order to enable blind people to read content in a structured way, headings are the most important elements for navigation and orientation. In this area, *Word* provides a good conversion to PDF. Headings are already defined in the standard style sheet (Figure 19) normal.dot and can be used like normal style sheets: Mark text and click on the desired template for headings.

In the **outline view**, check that you have applied the headings correctly. This means that the hierarchy of the heading levels should be correct.

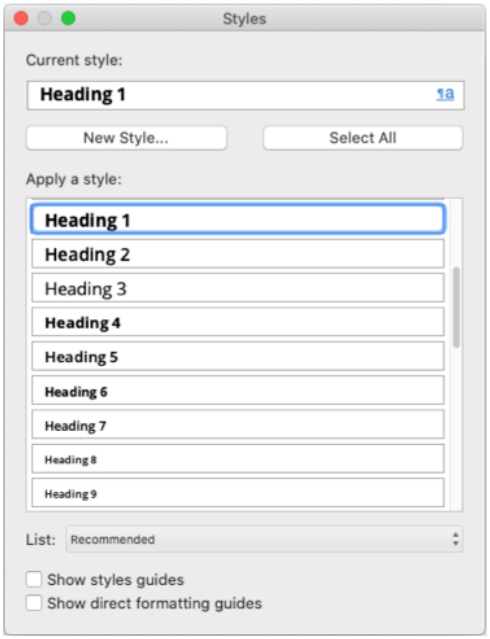

Figure 19 Style Sheets for Headings

6.2.3 Paragraphs

You should format simple sections of text in your document as such. The corresponding Style Sheet is usually referred to as Standard. Depending on how your document is to be designed, different variations of the template can be created. For the entire document you can check in the Outline View (Figure 20) whether all paragraphs are of the element type **Body Text**. If this is the case, a correct conversion to PDF is usually provided.

Tab **Outlining** ⟶ Grouping **Outline Tools**

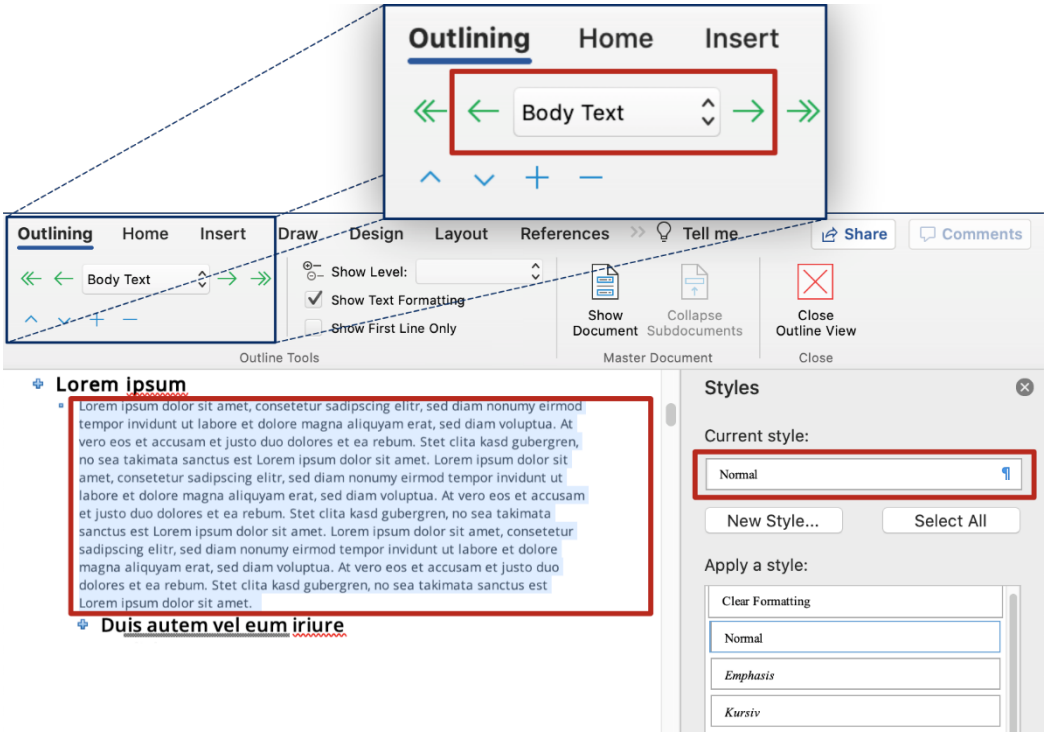

Figure 20 Changing the Styles in the Outlining View

Tab **Home** ⟶ Grouping **Paragraph** ⟶ **Lists**

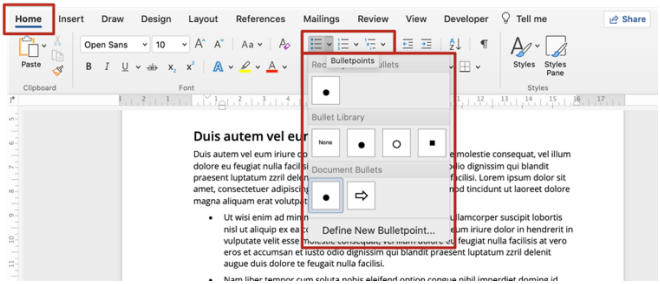

Figure 21 Insert List Formatting

6.2.4 Lists

To create lists, use the predefined list formats in *Word*. You can find the list templates under the **Home** tab in the **Paragraph** grouping (Figure 21).

Note: The visible Bullet is not accessible to blind people. The Bullet itself should therefore have no meaning in terms of content. For example: Displaying a positive-negative list using plus and minus signs is unsuitable. Such additional information should appear in the text.

6.2.5 Links and Cross References

Links or cross references in the document should be active links. In your source document such active elements can be opened with **Ctrl + click** and lead to the linking element.

External Links

A so-called AutoFormat function is active in *Word* by default. This has the effect that an active link is automatically generated when entering an external link, for example www.google.de, so that the entry of the link is completed with a Space or with Enter. Alternatively, a link can also be inserted via the **context menu**. Just place the mouse pointer at the desired insertion position of the link or mark the text to be linked and open the context menu. Via the entry **Link** or **Hyperlink**, you open the dialogue window **Insert Link**, as shown in Figure 22 and Figure 23.

The **Insert Hyperlink** dialog window allows you to insert the following types of links:

- Links to files or websites
- Links to new documents
- References to a heading or bookmark of the current document (requires the use of Style Sheets)
- Links to e-mail addresses

Use the **ScreenTip...** to set the alternative text of the hyperlink, e.g. the title of the website.

Cross References

Cross references within a document, e. g. to tables, figures or headings, can also be inserted via the special **cross-reference** dialogue shown in Figure 24. They are automatically updated if the reference source has been adapted.

Context menu ⟶ Link...

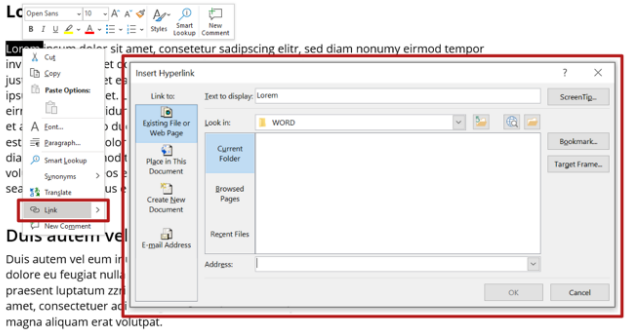

Figure 22 Insert Hyperlink in Windows

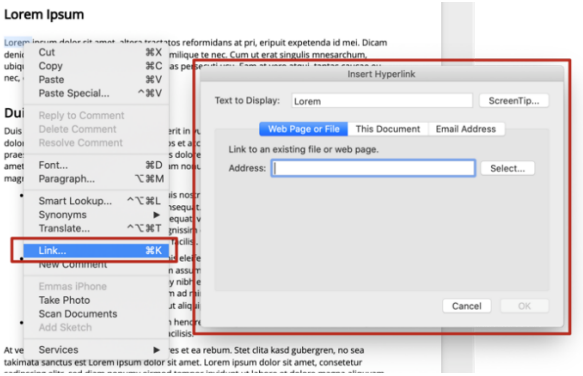

Figure 23 Insert Hyperlink in macOS

Tab **References** ⟶ Grouping **Captions** ⟶ **Cross-reference**

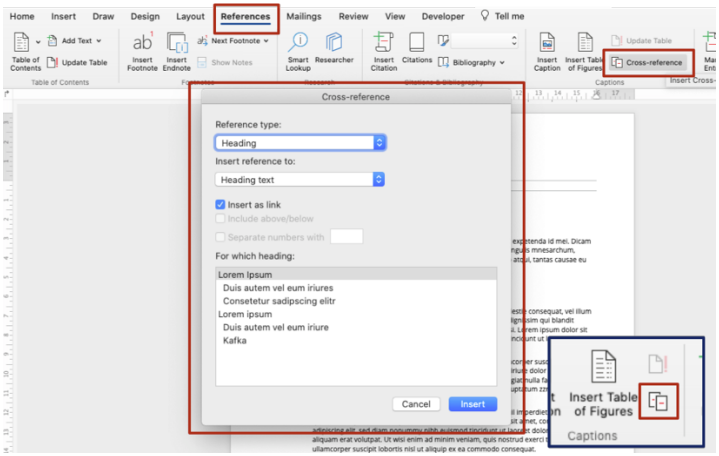

Figure 24 Insert a Cross-reference

6.2.6 Table of Contents

Tables of Contents have, similar to headings, the function of providing an overview, orientation and navigation. With *Word,* you can automatically create Tables of Contents which, when converted to PDF, enable active list-like navigation. This is based on you having created headings with the aid of Style Sheets, as described in this guide.

First, navigate to the location in the document where you want to place the Table of Contents. Using the **References** tab, you can now insert a Table of Contents. As shown in Figure 25, a list of templates for Tables of Contents appears. Select a template and the Table of Contents will be inserted in the marked position.

Note: Tables of Contents are active links. This means they refer to a specific section of text. They are active because you can select an entry to jump to the desired position in the document. Before publishing, you should check whether all active links are working correctly. It is therefore important to update the created Tables of Contents before converting the document to PDF (Figure 26 and Figure 27).

Tab **References** ⟶ **Table of Contents**

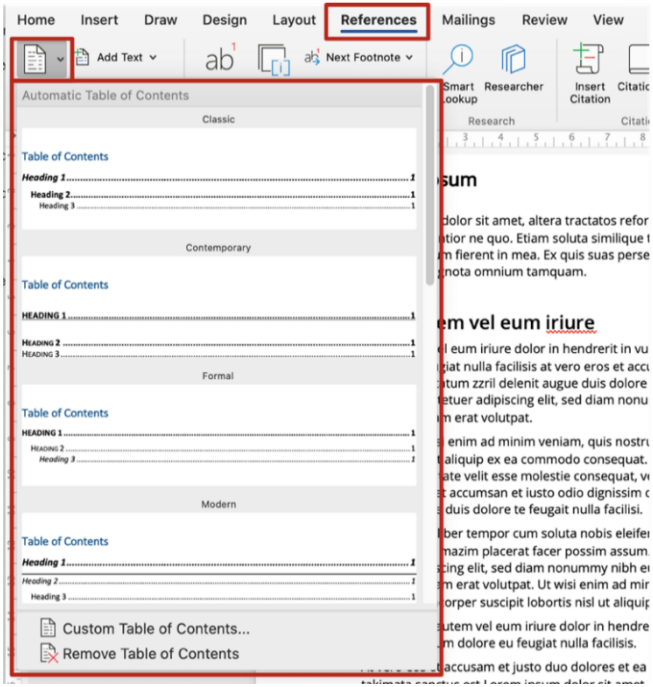

Figure 25 Insert Table of Contents

Click in the Table of Contents ⟶ **Update Table of Contents** ⟶ **Update entire table**

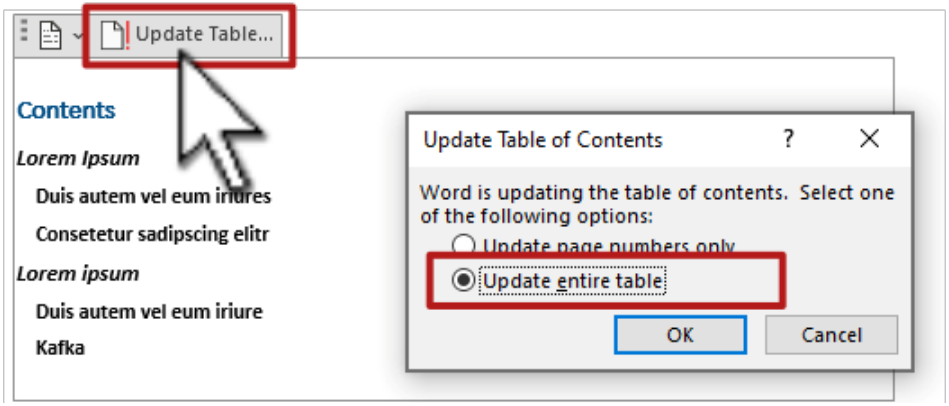

Figure 26 Update Table of Contents in Windows

Click in the Table of Contents ⟶ **Table of Contents** ⟶ **Update Table of Contents** ⟶ **Update entire table**

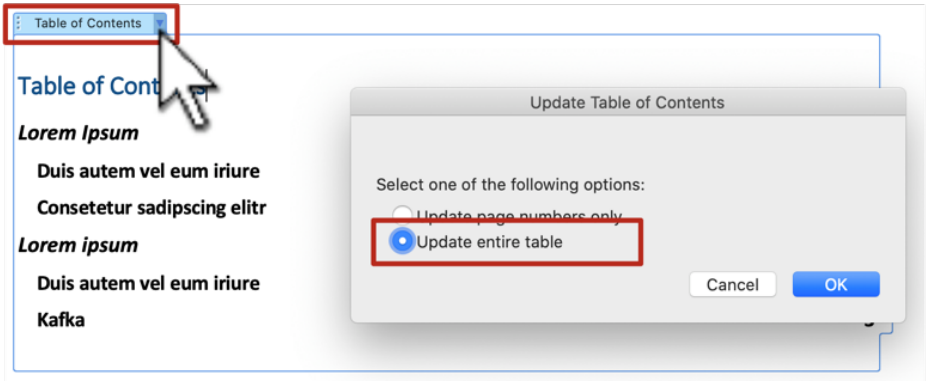

Figure 27 Update Table of Contents in macOS

Alternatively: Mark the complete Table of Contents/Document ⟶ F9 ⟶ **Update entire table**

Ctrl A ⟶ F9

⌘ A ⟶ F9

6.2.7 Tables

If the document is supposed to contain tables, you should pay particular attention to their logical structure.

When is a table logically structured?

Even blind people can read and understand tables. In the simplest case, they navigate from cell to cell using the keyboard and have the contents read out to them. Thereby they can recognise which cells are heading cells and thus understand the meaning of the individual information in the cells - provided that the table has the necessary structure and has not been brought into table form only visually. Figure 28 shows how a simple, logically structured table in PDF is presented to blind people.

The table in Figure 28 is introduced with `<Table>`. Rows are marked with `<TR>`, columns with `<TD>` respectively with `<TH>` for headings.

Pseudo tables, which are simulated in *Word* using tabs and spaces, should be avoided at all costs. The only reliable way to create tables in *Word* is to use the *Word* table tool.

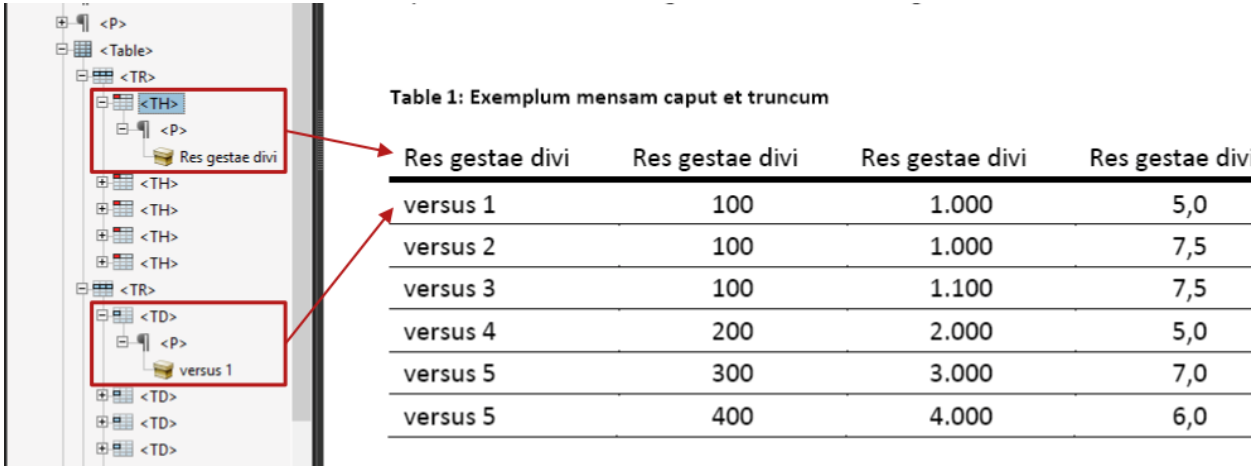

Figure 28 Setup of a logically well – structured Table in the Tag-Editor in Adobe Acrobat (on the left)

Step 1: Create a table

Place the cursor where you want to insert the table in the document. Open the Table Tool via the **Insert** tab (Figure 29). Basically, the tool supports six different options for inserting a table:

- Insert Table via matrix
- Insert Table by entering the number of rows and columns and other options for the table's width
- Draw Table
- Convert Text to Table ...
- Excel-Spreadsheet
- Quick–Tables

If you move the cursor over the matrix in the table tool, you can directly select the desired number of columns and rows and confirm by clicking. Except for Excel-Spreadsheets, all options usually allow the table to be correctly marked with rows and columns when converting to PDF.

Avoid Excel-Spreadsheets. These are not supported by the conversion option presented here and require subsequent manual marking and revision.

Tab **Insert** ⟶ **Table**

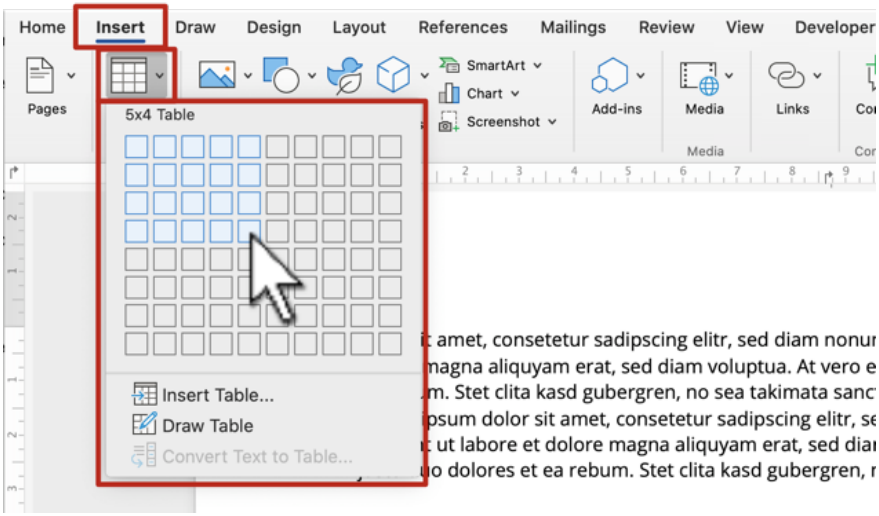

Figure 29 Insert Table via Matrix

Step 2: Marking Headings

Regardless of which option you use to create the table, the second step is to mark the header or the first column of the table as a heading, as shown in Figure 30.

At this point you determine whether your table has a Header Row (**Heading**) or a First Column (**First Column**), a combination of both is also possible.

A multi-page table is marked as multiple tables by *Word* when it is converted to a PDF document. You must therefore ensure that the header is repeated on each page. Therefore, check the **Repeat as header row at the top of each page** option in the **Row** tab of the **Table Properties** window (Figure 31 and Figure 32).

Note: For *Word 2016* and older versions, the **Repeat as header row at the top of each page** option must also be enabled for single page tables to ensure that the header is correctly marked when converted to a PDF document. In addition, correct marking of a first column is only supported from *Word 2019* onwards.

Note: Complex, multidimensional, nested tables are difficult or impossible for blind people to read. If possible, complex tables should be divided into several simple tables to ensure readability and accessibility. Alternatively, a meaningful description of the table should be included in the alternative text. Therefore, proceed as explained in the following chapter on image description.

Select Table ⟶ Tab **Table Design** ⟶ Grouping **Table Style Options** ⟶ Select **Header Row/First Column**

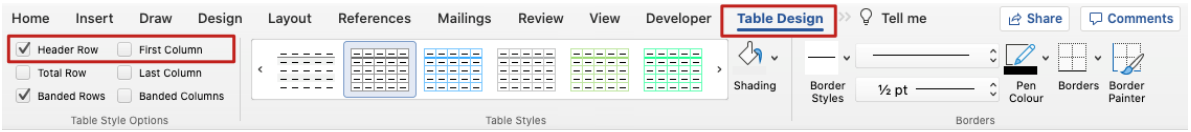

Figure 30 Header Row/First Column in the Tab Table Design

Mark heading cells ⟶ Open **context menu** ⟶ **Table Properties**

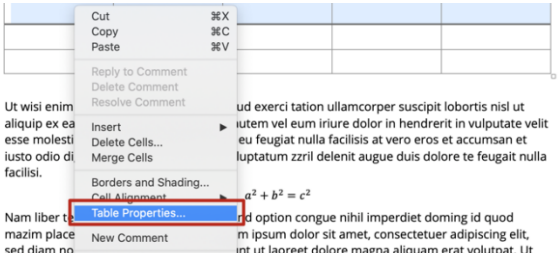

Figure 31 Open Table Properties via context menu

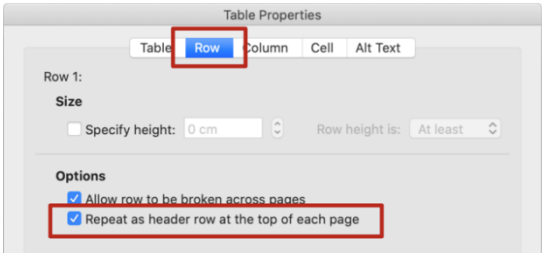

Figure 32 Dialogue window Table Properties

6.3 Image Description

Please note that pictures and graphics require a meaningful alternative description in order to be accessible to blind people.

6.3.1 Digression: Image description

Blind people cannot understand images, graphics or diagrams without help. They need an explanation of the contents, a so-called alternative description.

A good image description should have the following characteristics:

- Objectivity (do not introduce your own interpretation)
- Comprehensibility (taking into account the target group)
- Meaningfulness (the description must make sense both without and within the context)
- Clarity and compliance with didactic knowledge
- Effectiveness (keep information complete, but as brief and concise as possible).

The image description should be consistent and structured in a strict order according to the type of graphic. The internal reading flow of the graphic should also be taken into account. When describing the image, you should begin with a rough and general description and move on to more detailed and specific information.

An image description should enable the non-visual reader to obtain all the necessary information according to the purpose of the graphic.

The description should include the following information depending on the context and purpose of the image:

- Intention and purpose of the picture
- Place depicted
- Objects, buildings, people
- Emotions, atmosphere
- What happens in the picture?
- Colours (however, in diagrams the description of visual attributes is only necessary if it provides additional information)

Only include information that is not accessible in any other way, e. g. you should not simply repeat the caption.

6.3.2 Defining alternative text for images

Since *Word 2019* there is the toolbar **Alt Text** (Figure 34), which allows you to add an alternative description to an image. It can be opened via the context menu (Figure 33). Provide a meaningful description of the content.

Decorative graphics without any relevant information can be marked as decorative at this point. In this case they will be ignored by assistive technologies.

Since *Word 2019* the possibility of generating an alternative text for images has also been available. Currently, however, these alternative texts are not very meaningful, so it is not recommended to rely on this function.

In older versions of *Word*, you can enter an alternative text under Layout and Properties in the **Format Picture** Toolbar (Figure 35).

If possible, do not use ***SmartArts***. In the current version, *Word* makes several images from a SmartArt when converting it into a PDF document and does not adopt the alternative texts set on the SmartArt. Save the SmartArt as an image and insert it into the document instead or use indented lists.

Diagrams should also be inserted as images because not all diagram elements are correctly marked when converted to a PDF document.

Select image ⟶ open **context menu** ⟶ **Edit Alt Text...**

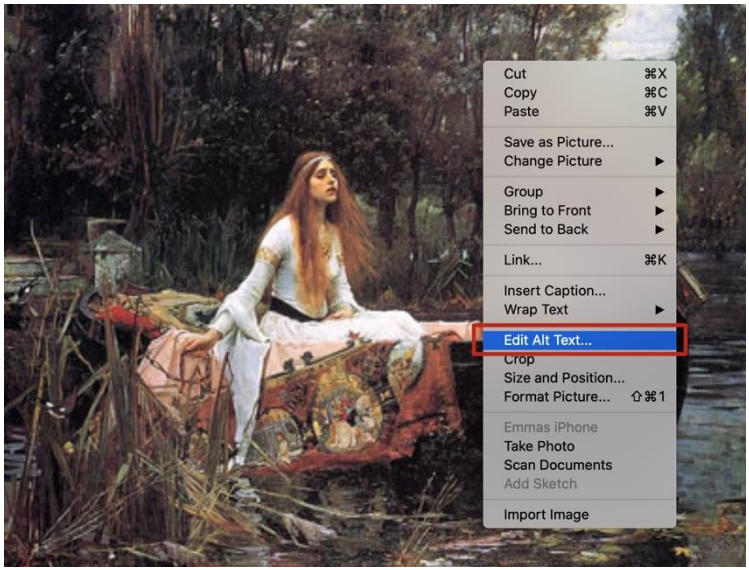

Figure 33 Open the Toolbar Alternative Text via context menu

Toolbar **Alt Text ⟶ Mark as decorative**

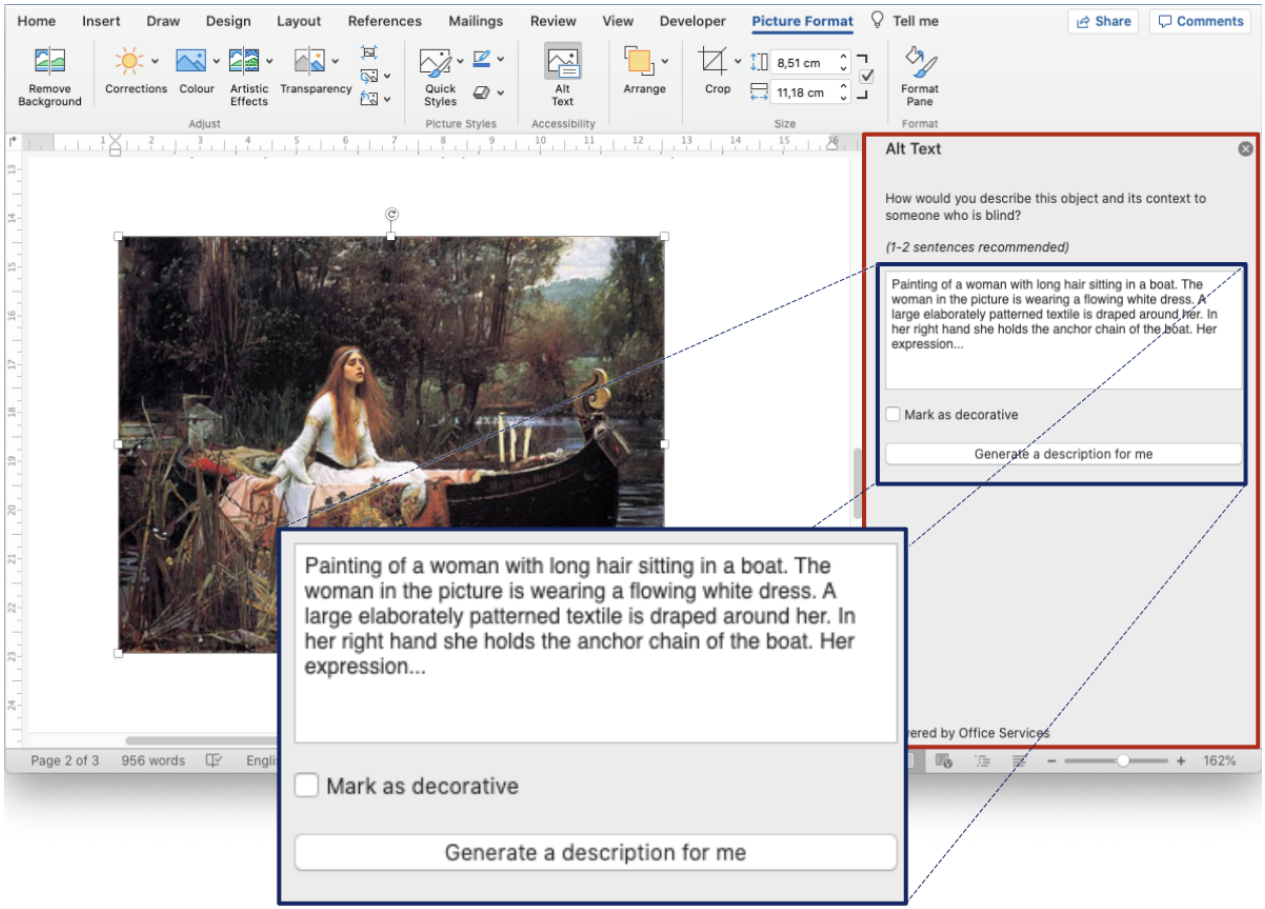

Figure 34 Toolbar Alternative Text

Select picture ⟶ open **context menu** ⟶ **Format Picture** ⟶ **Layout and Properties** ⟶ **Alt Text** 2016

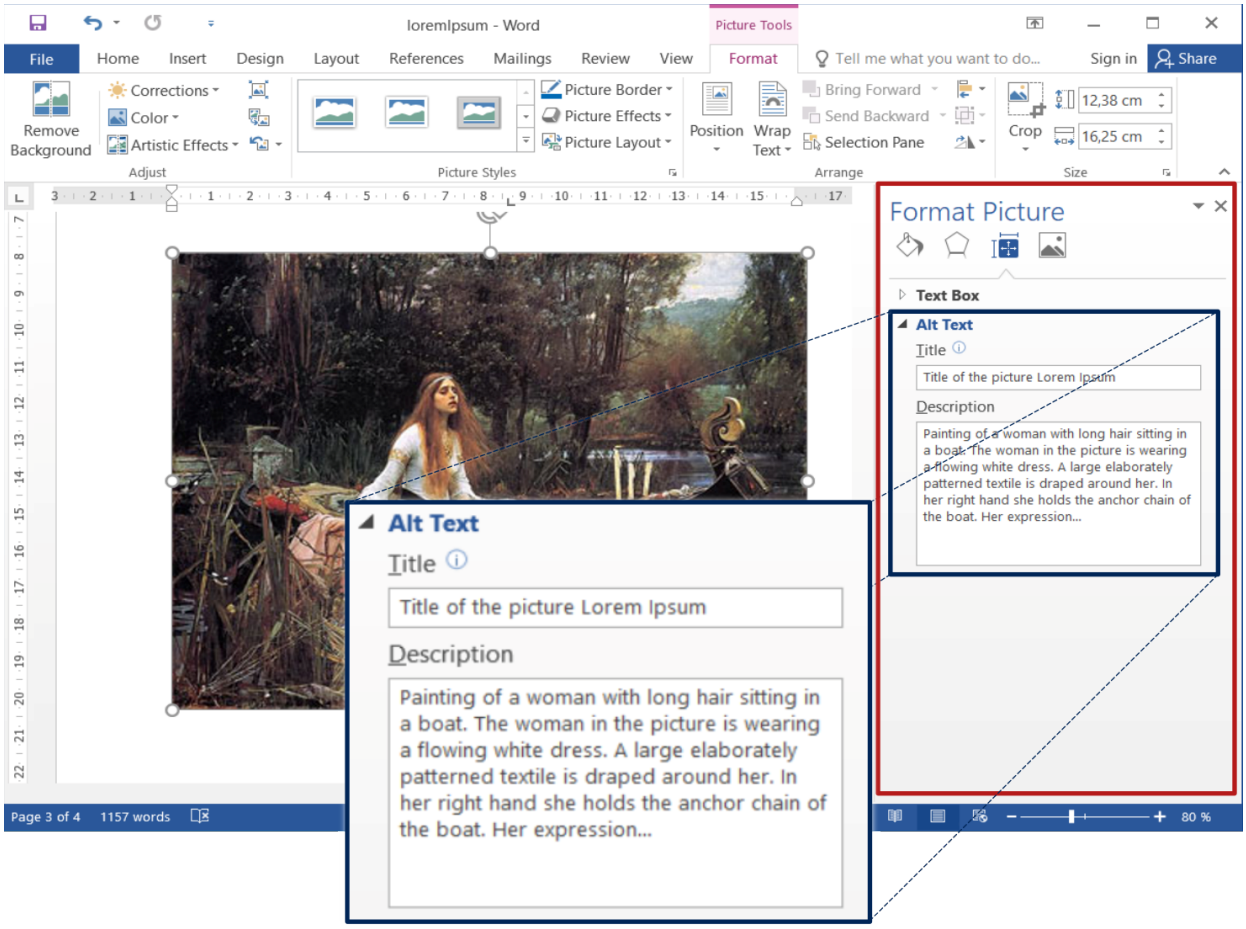

Figure 35 Insert Alt Text in Word 2016 and older

6.3.3 Examples for Alternative Descriptions:

There are different types of pictures, graphics and diagrams. If you have no experience with the textual description of your graphic content, the following examples can help you[5]. Please note that different information may be relevant depending on the context of the graphic.

Decorative Pictures (Decorative Graphics)

Backgrounds or other graphic decorative elements and placeholders in your document, which do not contain any information relevant to the content, do not require an extra alternative description. They must be marked as decorative via the **Alt Text** Toolbar. In older versions of *Word*, where this function does not exist, decorative graphics must be manually marked as artifacts in the final PDF document. Alternatively, you should consider removing purely decorative images from the document.

Figure 36 Example: Decorative Picture

Pictures with Text

With advertising, logos, etc. the alternative text should contain the text of the graphic. In the example of Figure 37 the alternative text should be as follows:

Font graphics: Blindtext weiss

Figure 37 Example: Picture with Text

Content Relevant Pictures

The picture refers to the content, but is not described in detail in the text. Alternatively, a link to the detailed image description can be provided. A possible alternative description for Figure 38 is:

Painting of a woman with long hair sitting in a boat. The woman in the picture is wearing a flowing white dress. A large elaborately patterned fabric is draped around her. In her right hand she holds the anchor chain of the boat. Her expression …

[5] The examples are based on the recommendations of the Practical Guide for the Creation of Text-based Alternatives for Graphics of the DVBS (The German Association of Blind and Visually Impaired Students and Professionals) (German)

Figure 38 Example: Painting

Charts

For a chart description you should keep to the following structure:

1. ***Overview:*** Title, chart type, general content, special features such as alignment
2. ***Axes:*** arrangement, labelling, unit, scale (range of values, intervals), intersection point of the axes
3. ***Data,*** depending on the type of chart, for example: number of data series, name and arrangement of data, description of rough progressions, actual data values (tabular, if possible)

Depending on the purpose of the chart and the description, you can also integrate subjective statements regarding the chart content into the chart description. However, you must mark these as interpretations or your own interpretations. A possible alternative text for the chart in Figure 39 is:

Expenses of the last years. Bar chart. Above the columns you will find the respective values of the vertical axis.

The horizontal axis is a time axis with the years 2000 to 2004. The vertical axis is not shown and has the unit millions.

A data series is shown. The values for the years 2000 and 2004 are significantly smaller than the values for the years 2001 to 2003.

Data values: 2000: 5,7 Mio., 2001: 22,6 Mio., 2002: 21,9 Mio., 2003: 22,6 Mio., 2004: 6,7 Mio.

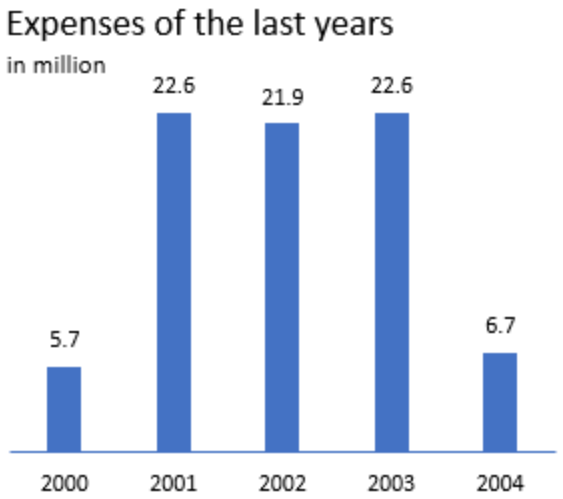

Figure 39 Example: chart

Formulas

If you use pictures in your document that contain mathematical representations such as formulas or special characters, the alternative text should contain a textual version of this formula.

If possible, do not insert formulas via *Word*, as they are often not accessible. You can save the formula as an image using a screenshot, in Windows for example with the *Snipping Tool*[6], in macOS with the app *Screenshot*[7]. You can insert this image into the document and set an alternative text.

If you need to insert many formulas in your document, we recommend the Office Add-In *MathType*[8]. With this you can create and edit formulas in *Word*. These are inserted in the document as images to which you can assign alternative texts.

When describing formulas, ensure that they are clear. If your document has many formulas, you should use *LaTeX* or *MathML* notation in the alternative text to make your graphical formula representations accessible. You can find more information on this topic in the corresponding literature[9].

The alternative text of the illustrated formula of Figure 40 in LaTeX Equation:

Equation: \ [a = b + 2 * k * \pi \]

Or written out in text form:

Equation: a is equal to b plus 2 multiples of k multiplied by Pi

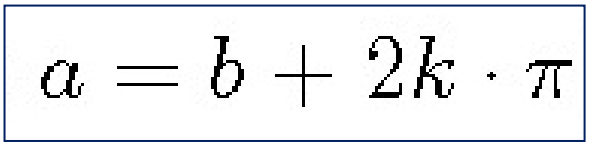

Figure 40 Example: Formula

For further examples of alternative descriptions we recommend the Practical Guide for the Creation of Text-based Alternatives for Graphics (German) of the DVBS.

[6] Taking a Screenshot by Means of the Snipping Tools in Windows

[7] Taking Screenshots or Screen Recording on the Mac

[8] Design Science: MathType

[9] Wikibooks, Library of free textbooks, non-fiction and specialist books: Compendium LaTeX: For Mathematicians (German)

5.4 Accessibility Check with Office

Before you export a *Word* document to PDF and then have to make elaborate improvements to the PDF document, it is worthwhile having an internal *Office* check for accessibility problems first.

Note: With the steps described here you create an accessible *Word* document. However, problems resolved in *Office* will not prevent problems from appearing in the exported PDF document.

Since *Office 2010* an integrated accessibility check is available in all *Office* applications. Since *Word 2019* a new menu item has been available in the **Review** tab of the ribbon (Figure 41). With older versions the check is started via the file information (Figure 42).

The **Accessibility** toolbar opens in the right sidebar. At the top of the toolbar there is a list of errors and warnings grouped by type. Clicking on an **error** or **warning** immediately selects the affected element so that you do not have to search for it.

Below the list there is an area that provides more detailed information about the selected error. It also contains reasons for the need to correct the error and information on how to correct it.

In the example shown in Figure 43, it is criticised that the picture inserted in *Word* does not contain any alternative text, that linked cells exist in a table and that difficult to read text contrast has been found.

Contrast checks are only included since *Office 2019*. For older versions, you can use an extra program, e. g. the *Colour Contrast Analyser* (page 45).

Tab **Review** ⟶ Grouping **Accessibility** ⟶ **Check Accessibility**

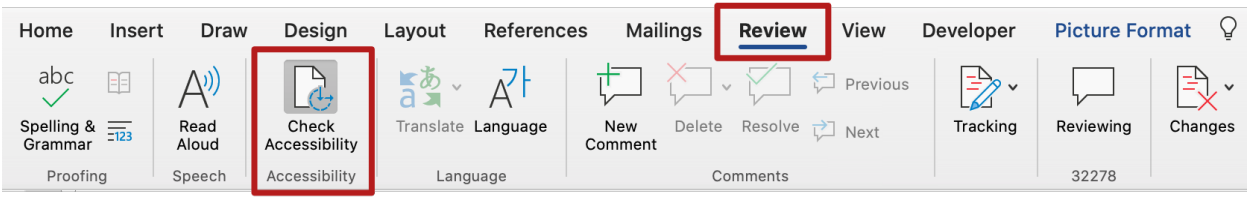

Figure 41 Check Accessibility via the Tab Review of the Ribbon

Tab **File** ⟶ **Info** ⟶ Button **Check for Issues** ⟶ **Check Accessibility**

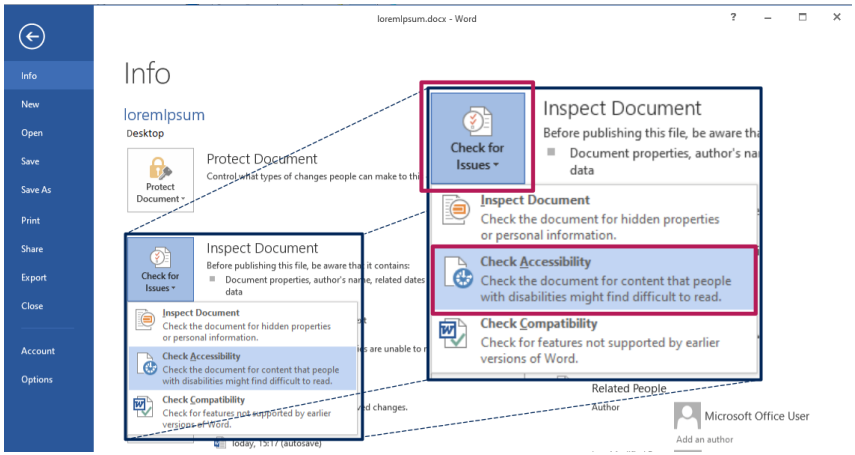

Figure 42 Accessibility Check in Word 2016 and Older Versions

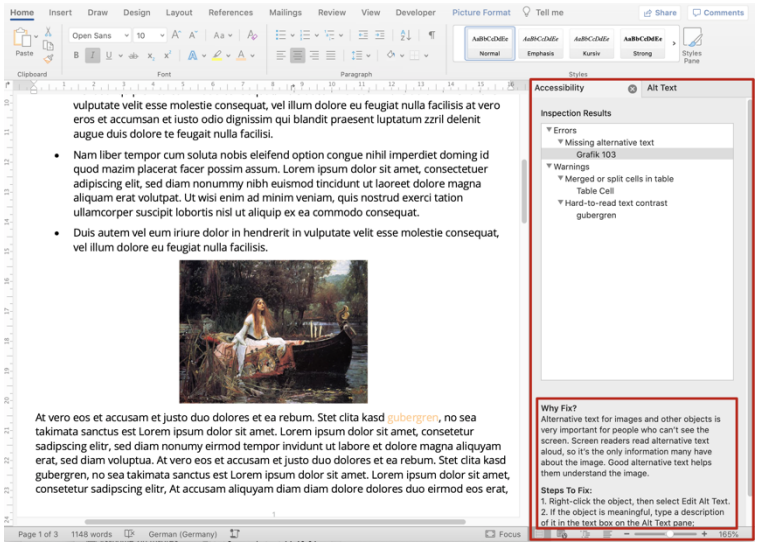

Figure 43 Toolbar Accessibility with the results of the check

6.4 Creating a PDF Document

You have structured your document as simply as possible and with the help of Style Sheets? Have you provided images with alternative texts and checked your links and references for up-to-dateness? Does your document have a title? Then you have gotten closer to creating your accessible PDF document. Now you only have to export your document as PDF.

There are of course many more ways to create PDFs, as there are numerous programs and extensions for conversion. Not all of these programs will maintain the logical structure of your document. The option recommended here will adopt a large part of the preparations correctly.

It is not advisable to use a so-called PDF printer, as it does not export the logical structure.

6.4.1 Exporting as PDF on Windows

Tab **File** ⟶ **Export** ⟶ **Create PDF/XPS-Document**

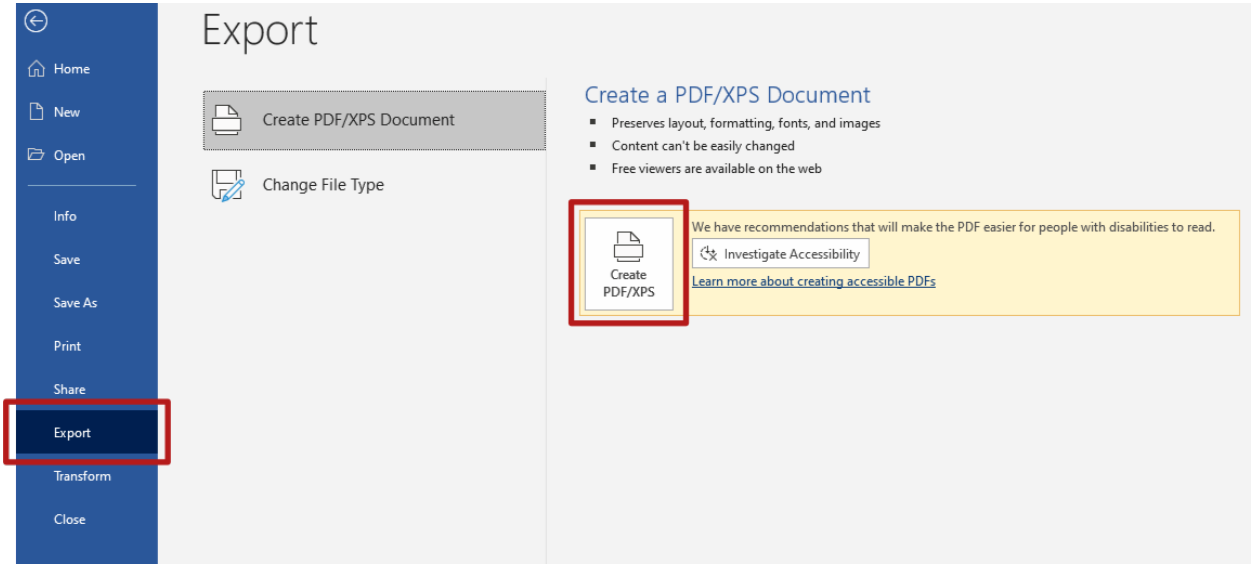

Figure 44 Export view of Word in Windows

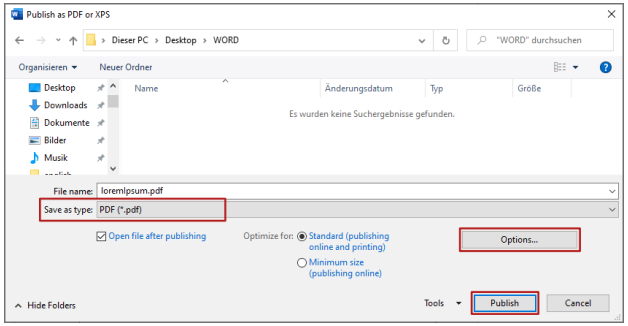

Figure 45 Dialogue window to export a Word document on Windows

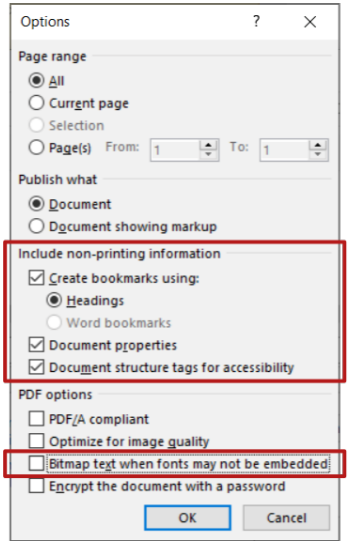

Figure 46 Export Options of Word on Windows

In the **Publish as PDF or XPS** dialogue window (Figure 45), the file name, type and location for final publication can be specified. You can also open this dialogue with the button F12 as an alternative to the steps just described (Figure 44). Then, however, you must still select **PDF** as the **file type.**

Use the **Options** button in the dialogue to specify settings for PDF export. Set the following options as shown in Figure 46. Confirm by clicking the **OK** button and save the document with the **Publish** button.

- Option **Create bookmarks using headings**: All headings are converted to bookmarks, provided that you have worked with styles and have used headings appropriately.
- Option **Document properties**: adds information to the PDF, such as the document title.
- Option **Document structure tags for accessibility**: all structure information is added to the PDF.
- **Disable Save text as bitmap [...].** This would cause text contents to be saved as image information, making them unreadable for non-visual users.

6.4.2 Save as PDF on macOS

Before saving your document as a PDF, you must first ensure that the fonts are embedded in the file. This can be done by opening the preferences and selecting the option **Embed fonts in the file**, as shown in Figure 48. You can then save the file (Figure 49 and Figure 50).

In the dialogue **Save as...** the file name, file type and location for the final publication can be defined. Set the file type to **PDF** and select **Best for electronic distribution and accessibility** as shown in Figure 50. Then save the document using the **Export** button.

Menu entry **Word** ⟶ **Preferences...** ⟶ **Save** ⟶ **Embed fonts in the file**

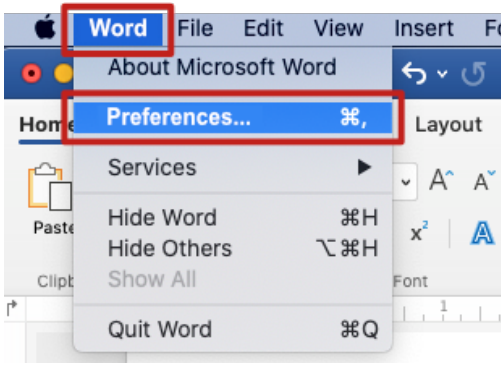

Figure 47 Open Preferences on macOS

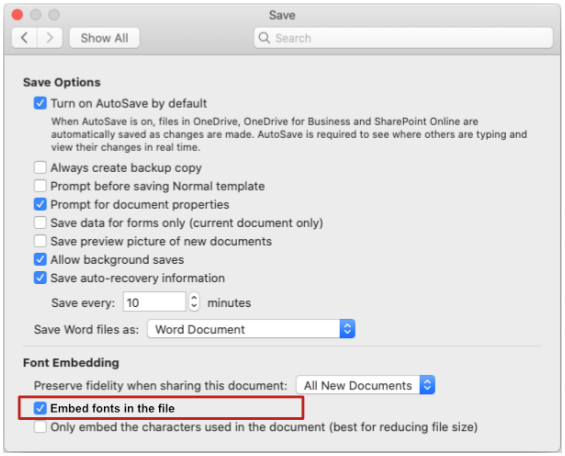

Figure 48 Preferences "Save" on macOS

Menu Bar **File** ⟶ **Save as...**

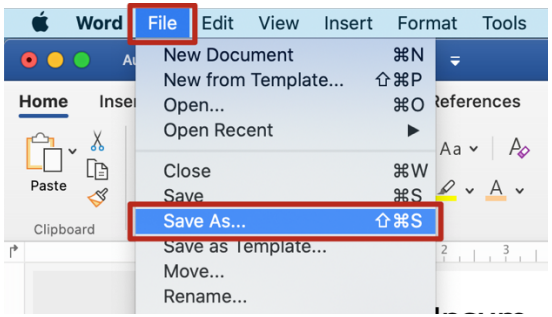

Figure 49 Open "Save as..." on macOS

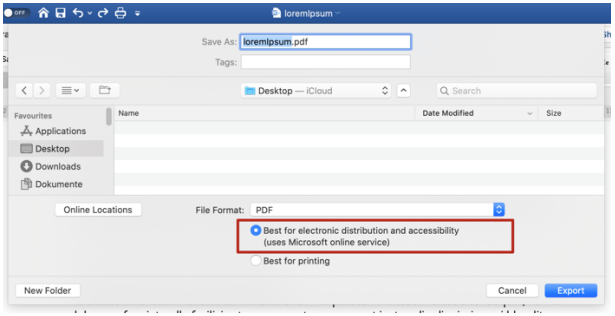

Figure 50 "Save as..." Dialogue on macOS

With the Office Add-in PDF Maker available from Adobe or the Add-in axesPDF for Word, you can export PDF documents from Word, which usually have fewer errors when checked for the PDF/UA standard than documents that have been exported with Word itself as described above.

Why are bookmarks so important?

Bookmarks are an important element for navigating and orienting yourself in documents. When you view a document that contains bookmarks, they are displayed in the left sidebar. If you click on a bookmark, the focus in the document jumps directly to the corresponding content. This is a very helpful feature, especially for long documents.

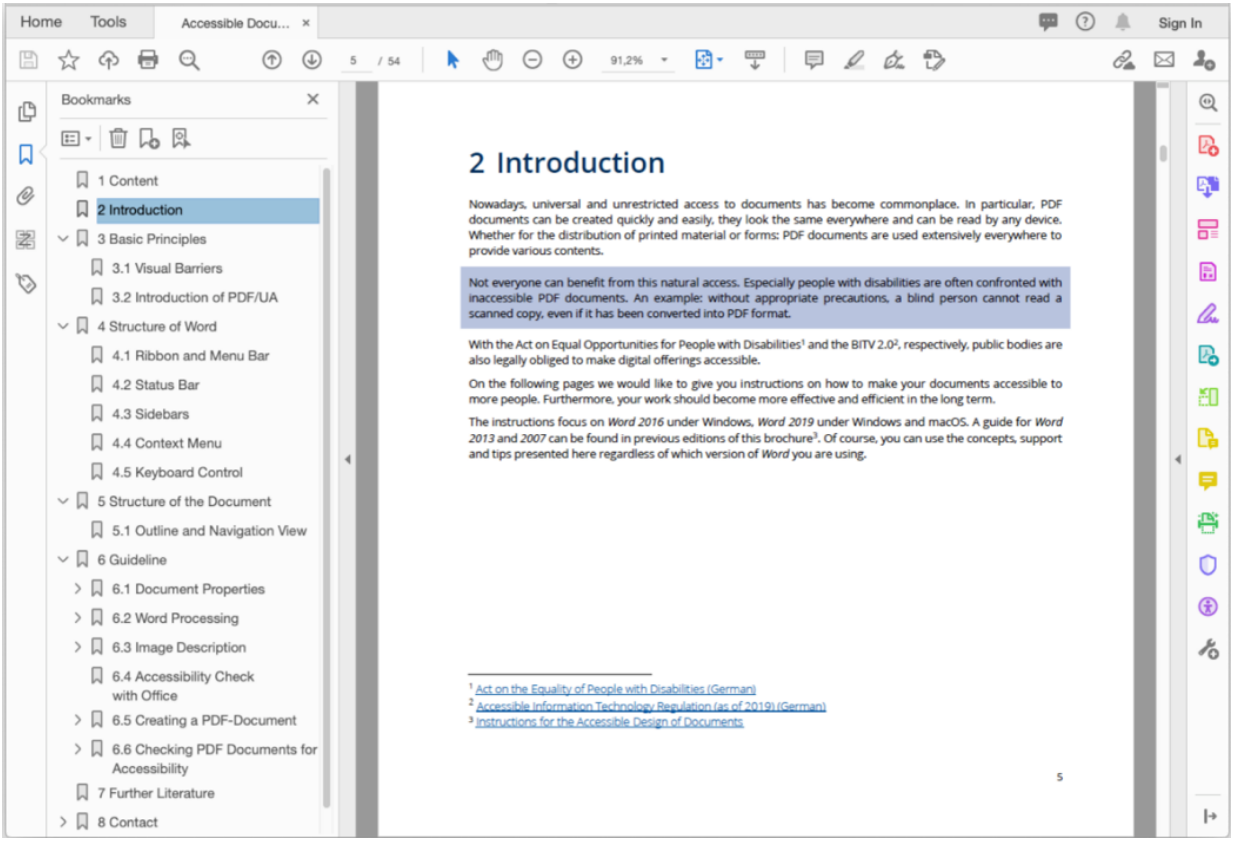

Figure 51 Bookmark List of a PDF Document in Adobe Acrobat

6.5 Checking PDF Documents for Accessibility

There are many ways to review and improve the accessibility of PDF documents. Possible tools for automatic and manual checking and correction are described below.

It should be noted that an automatic test method cannot be used to check the sense of the reading sequence, table structure and alternative texts. These must therefore be checked manually. The same applies to maintaining the minimum contrast between text and background, for which programmes such as the *Colour Contrast Analyser* can be used. It can be downloaded via the website of Colour Contrast Analyser.

Figure 52 PAC 3 application window

6.5.1 Checking Accessibility with PAC 3

The *Free PDF Accessibility Checker (PAC 3)* is a program used to check for compliance with the required guidelines of the PDF/UA standard. The program itself does not need to be installed but is only available for Windows operating systems. It provides a detailed inspection report on any problems found in the document (Figure 53) and offers a preview of what the document would look like with an assistive technology. This allows the reading order and nesting to be checked.

The programme can be downloaded from the website PDF Accessibility Checker (PAC 3).

The programme *PAC 3* itself cannot automatically solve any problems and does not offer any editing options. After the test and on the basis of the test report, any problems found must be corrected with another programme (e. g. *Adobe Acrobat DC*, *axesPDF QuickFix*).

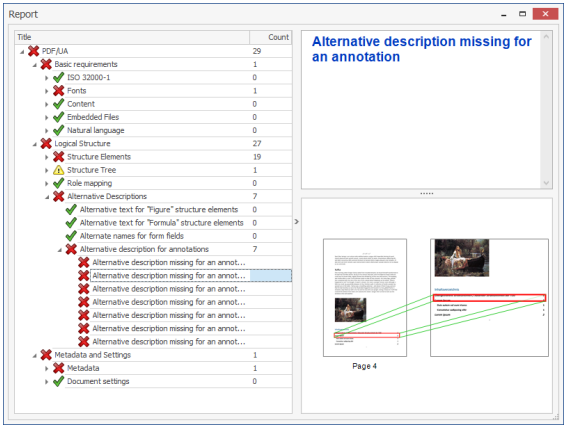

Figure 53 Detailed inspection report of PAC 3

6.5.2 Checking and Improving Accessibility with Adobe Acrobat DC

Adobe Acrobat DC is a fee-based programme for editing PDF documents. It offers both the possibility to check PDF documents for compliance with the PDF/UA standard and to correct errors. In contrast to PAC 3 and axesPDF QuickFix, it is not only available for Windows but also for macOS.

Many functions of *Acrobat DC* are accessible via the context menu of an element. You can open this menu with the right mouse button or by pressing the Shift key ⇧ and F10.

As shown in Figure 54, the display of the open PDF document is located in the centre of the *Acrobat DC* window. Some tools are listed in the right sidebar. In the left sidebar - the navigation area - other views of the document are available, including lists of bookmarks and tags. Use F6 to switch the focus between the areas.

Using the **Preflight** window shown in Figure 55, the opened PDF document can be checked for compliance with the PDF/UA standards. The window can be searched and opened via the input field of the tool sidebar. In the **Preflight** window under the **Profiles** tab, choose **PDF/UA** and then select **Verify compliance with PDF/UA-1**. Pressing the **Analyze** button at the bottom of the window starts the checking process. If you cannot find the profile on your computer, enter **PDF/UA** in the **search field**

After the checking, the **Results** tab opens and lists any errors (Figure 56). Some errors, such as a missing PDF/UA mark or a missing document title, can be corrected directly in the Preflight window. Therefore, again under the **Profiles** tab open the view **Select Single Fixups** (spanner symbol). Depending on the selected library, various correction options are listed here.

To check and edit the reading order and structure, the view of the **Tags** can be found in the *Acrobat DC* sidebar. Here the document structure is visible in a nested list of tags, with the actual elements of the document marked with a box symbol. By selecting a list entry, the corresponding elements are marked in the document preview. The reading order and nesting can be changed by dragging the individual tags. Alternatively, a tag can be cut out and inserted after another selected tag.

Cut: Ctrl X Paste: Ctrl V

Cut: ⌘ X Paste: ⌘ V

Note: There is a view entitled *Order*, which determines the reading order in the Reflow Acrobat display mode. Currently (as of October 2020), however, the reading order defined there is independent of the order of tags used by assistive technologies such as screen readers. Therefore, we would like to emphasise here that editing the reading order must be done in the view **Tags**, so that the document is accessible.

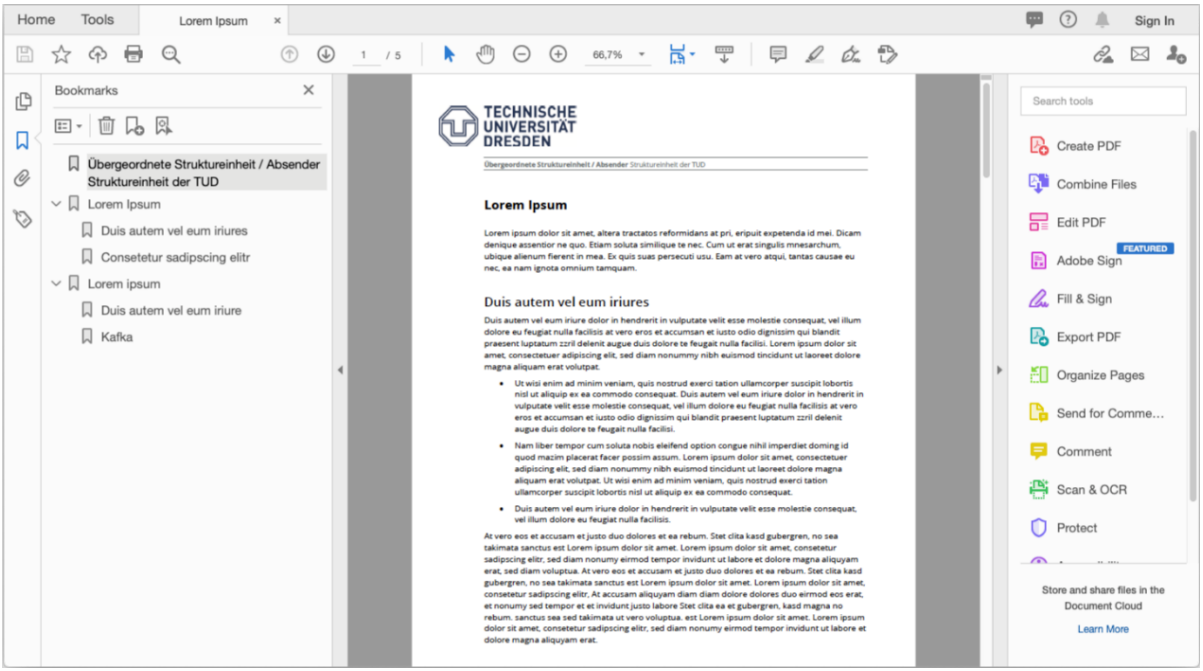

Figure 54 Adobe Acrobat DC window

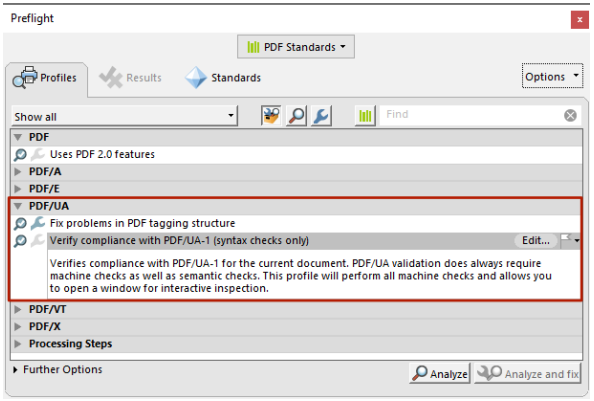

Figure 55 Acrobat DC PDF/UA Inspection in Preflight Window

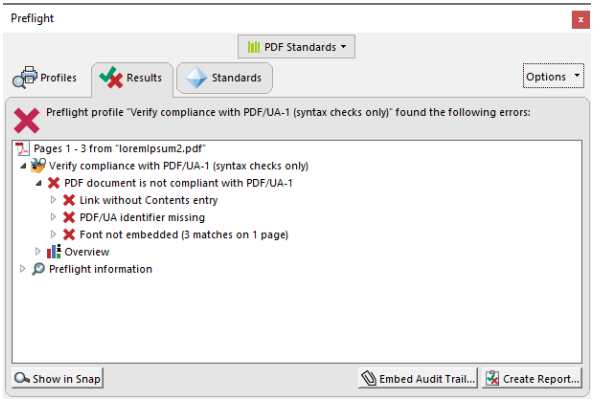

Figure 56 Acrobat DC PDF/UA Inspection Results Preflight Window

The Tag view also shows whether the elements in the document are correctly tagged, e. g. whether headings have been marked as such. Opening the **context menu** of a tag and selecting **Properties...** opens the **Object Properties** window as shown in Figure 57 and Figure 58. Information such as the tag type, the language and the alternative text can be changed here. For example, if a second level heading is marked as <P> instead of <H2>, the tag type can be changed in the properties window using a checkbox

Purely decorative elements in the document, which do not offer any added value in terms of content, must be marked as such so that they are ignored by assistive technologies. To do this, you have to open the **context menu** for the corresponding element in the tag window and select **Change tag to extra-textual element...** This marks the element as artifact and it will not be displayed in the tag window.

Caution: If you delete an element from the tag tree, it is not automatically marked as an artifact, but is considered an untagged element in the document, which leads to errors when checking for PDF/UA.

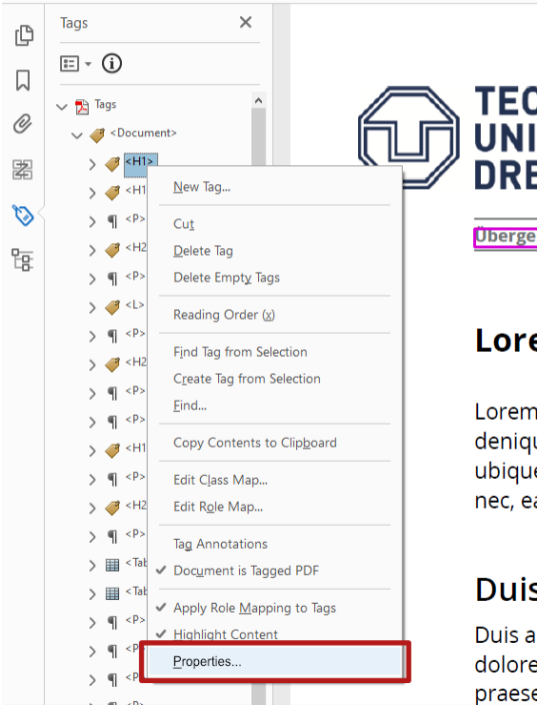

Figure 57 Opening Acrobat DC Object Properties via the context menu of a tag

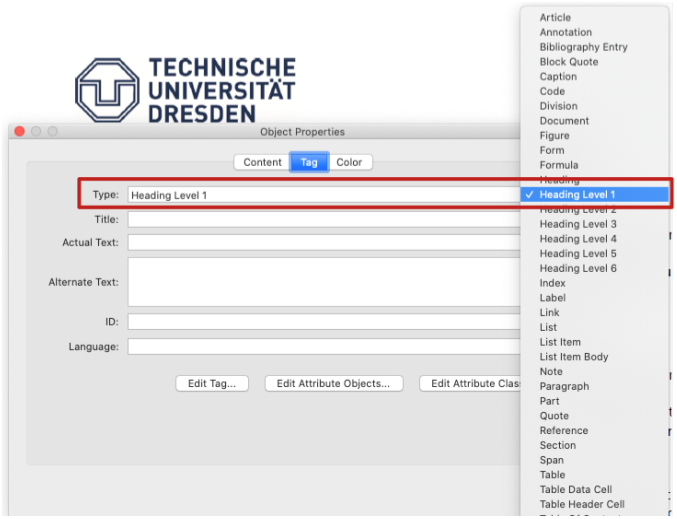

Figure 58 Acrobat DC Object Properties window

Complex tables are a major obstacle in creating accessible documents. *Acrobat DC* offers a **Table Editor** that can be used to add information to the table cells. The table editor can be started via the **context menu** of the <Table> tag in the tag window (Figure 59). Now the corresponding window is opened via the **context menu** of a cell and by selecting **Table Cell Properties...** (Figure 60). Here, a cell must be marked as a header or data cell. For header cells you can also specify whether they refer to columns, rows or both (Figure 61). Data cells must also be assigned to the corresponding header cells, which is also possible in this window (Figure 62). At **Assigned Header Cell IDs**, a corresponding header can be selected and added by clicking the button that is labelled with a plus symbol.

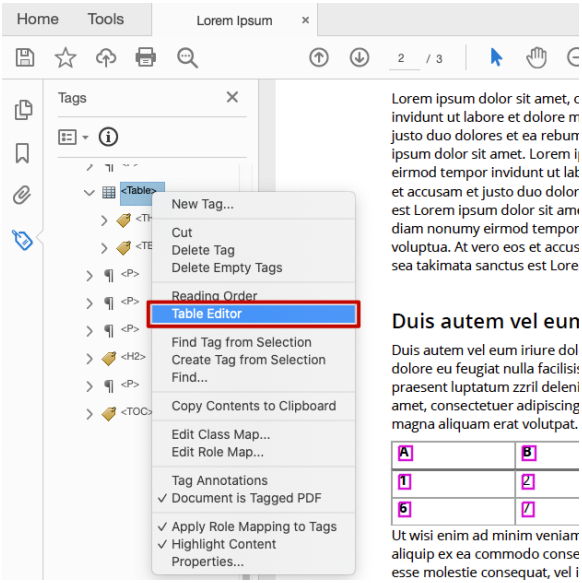

Figure 59 Opening Table Editor via context menu of Table-Tag

If your table has linked cells that extend over several columns or rows, then this must be set explicitly in the table cell properties. There are two input fields for the number of columns and rows over which the cell extends.

If your table has borders, these may need to be manually marked as artifacts. If the corresponding path elements are already in the tag view, you can proceed as described for the decorative elements before. Otherwise, you must manually mark the individual path objects as **Background/Artifact** using the **Reading Order** tool, as shown in Figure 63. Therefore, select the path object by dragging the mouse pointer over it while pressing the left mouse button. Then select the **Background/Artifact** button in the **Reading Order** window.

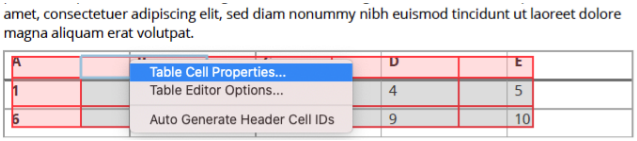

Figure 60 Context menu of a Table Cell

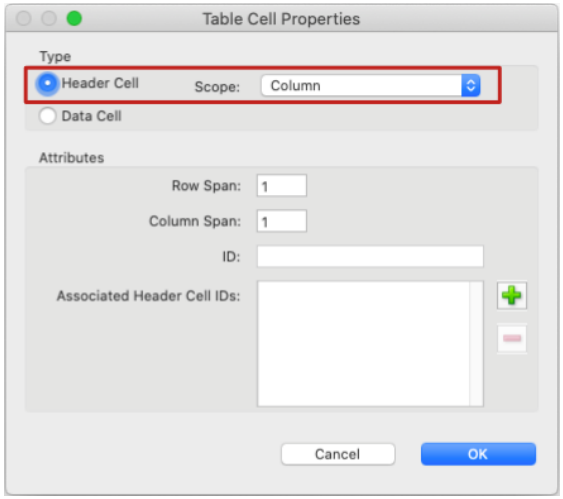

Figure 61 Table Cell Properties Window of a Header Cell

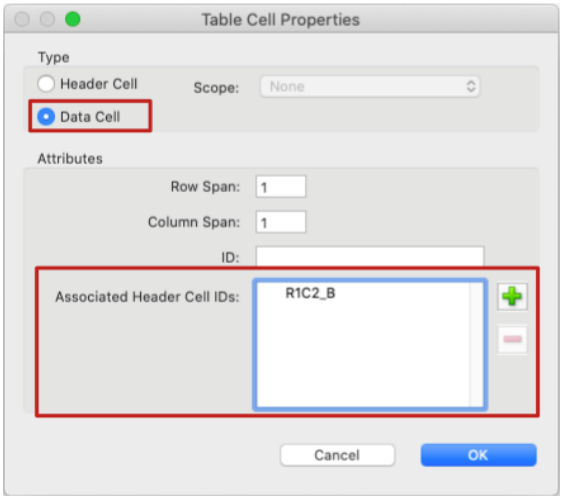

Figure 62 Table Cell Properties Window of a Data Cell

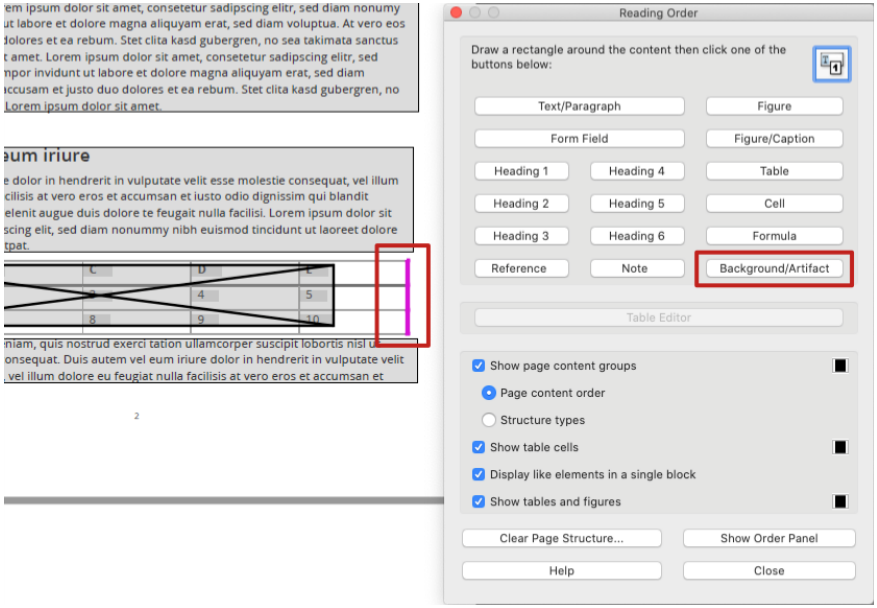

Figure 63 Labelling the table border as Artifact using the Reading Order Tool

6.5.3 Checking and Improving Accessibility with axesPDF Quick Fix

With the fee-based programme *axesPDF QuickFix*, PDF documents can be checked for compliance with the PDF/UA standard and WCAG 2. It also allows the correction of some errors. The programme is available for Windows and can be downloaded from the website:

axesPDF QuickFix

As shown in Figure 64, the **logical structure** is shown in a tree view in the left sidebar. Here you can check the reading order and the correct labelling of the elements. On the right side of the application window, there are various tools for checking and editing the document. Via the **Checker** tab in the right sidebar, a PDF/UA standard check of the document can be performed with the results displayed in a tree view. Click the **Refresh** button to start the check.

The **Properties** tab of the right sidebar displays the properties of the selected item. This is where, e. g. the label (structure type) can be changed or an alternative text can be set.

In the **Settings** tab of the right sidebar, you can change such settings as the document language and title.

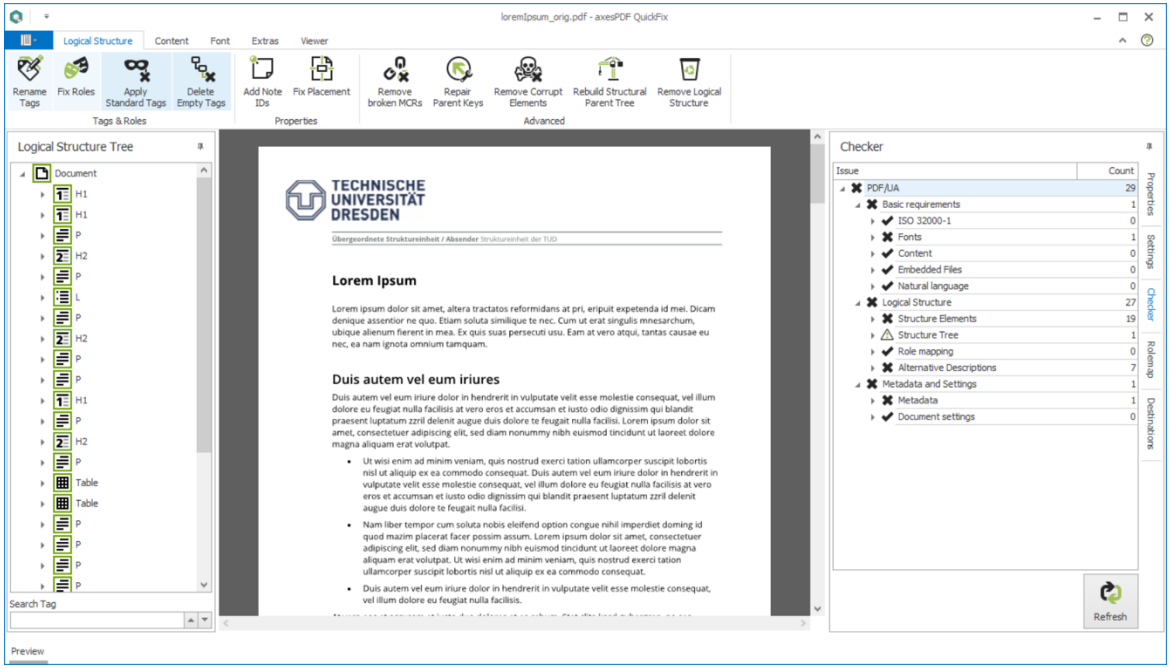

Figure 64 Application Window of axesPDF QuickFix

AxesPDF QuickFix is particularly suitable for marking up complex tables. With the **Table tool**, which is activated via the **Viewer** tab of the ribbon, cells can be assigned to the corresponding header cells by dragging them. In the **Properties** tab of the right sidebar you can also adjust the size of connected cells. As shown in Figure 65, the corresponding header cells can also be set here.

With *QuickFix*, you can re-mark already marked elements, but it is not possible to label unmarked elements or tag them as artifacts.

With the *axesPDF Word* Add-in *axesPDF for Word*, you can export PDF documents from *Word*. Among other things, the Add-In correctly tags even complex tables during export, footnotes are correctly indexed, and objects can be tagged as artifacts. The Add-In is also fee-based and can be downloaded from the website:

axesPDF for *Word*.

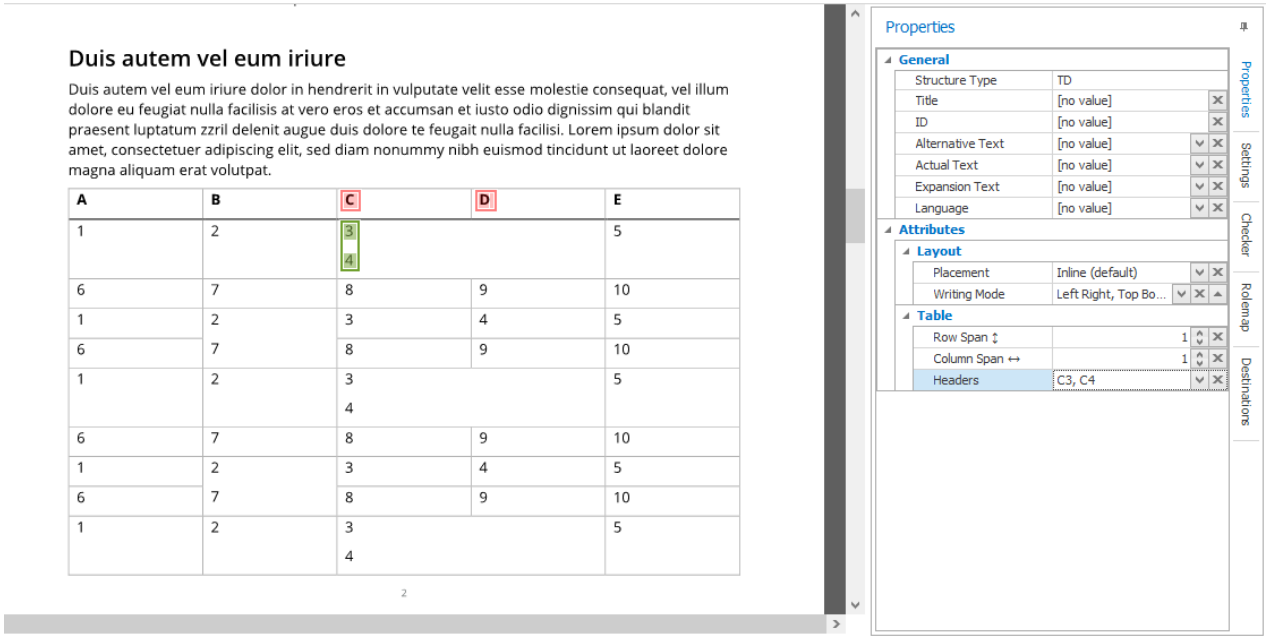

Figure 65 axesPDF QuickFix Properties of connected cells

6.5.4 Online Validation and Fixing With PAVE

Online tools for checking and improving the accessibility of PDF documents have the advantage that they can be used regardless of the operating system. On the other hand, you must first upload your PDF document to a website. It is not always clear what the website operator will do with the document, for example, whether it will be saved permanently or deleted after editing. Before using the online tool, you should therefore make sure that uploading your document is safe from a data protection perspective.

PAVE is an online platform that allows you to upload a PDF document, have it checked online and at the same time manually edit[10] any problems that are found but not automatically resolved.

The project can be accessed via the PAVE website.

Using the editing functions, the stored document information can be subsequently checked and modified and the document structure and element properties can be influenced.

Even if no error is displayed in the document properties, it is still worth checking them again via the **Properties** tab, as shown in Figure 69.

In the **Reading Order** tab, as shown in Figure 68, you can check and change the document structure and nesting of items. Use the pencil icon at the end of a list item to edit the selected item. Therefore, the **Tagging** view, as shown in Figure 69, opens. In this view you can, i. a., adjust the alternative text and the type of the element. For purely decorative elements, you must select **Not relevant (will not be read out)** for the element type here.

Complex changes are not possible with PAVE. Significant, extensive changes, such as subsequent grouping etc., can be carried out with the fee-based Adobe Acrobat DC, for example.

[10] Video Tutorial: Introduction to PAVE v2.0

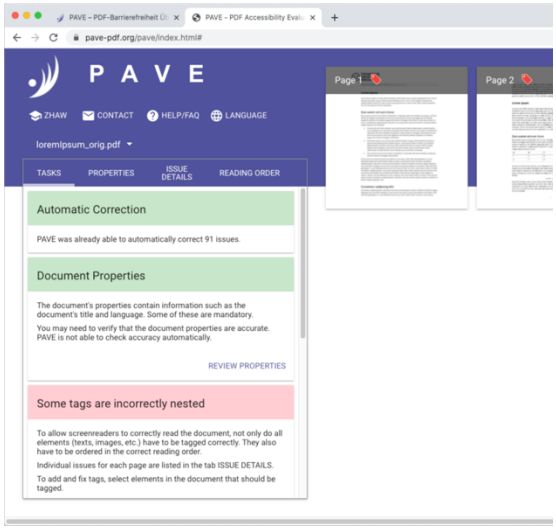

Figure 66 PAVE Tasks View

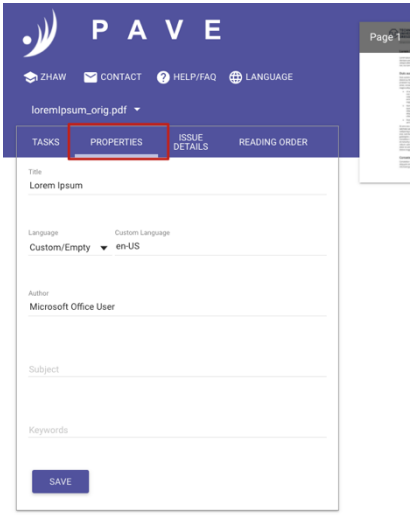

Figure 67 Document Properties in PAVE

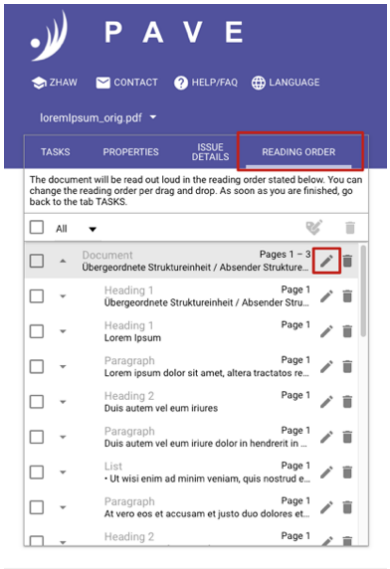

Figure 68 Reading Order in PAVE

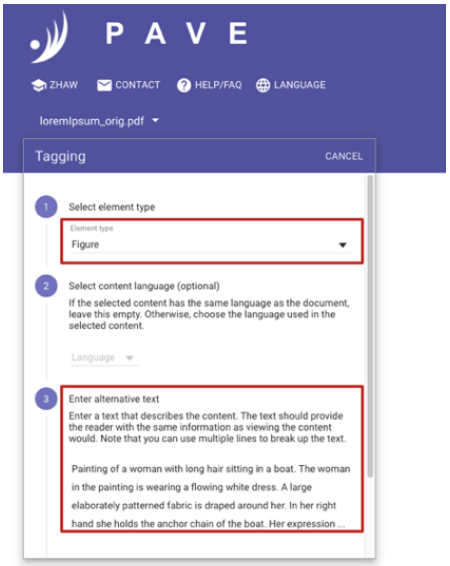

Figure 69 PAVE Tagging View to Edit Tags

7 Further Literature

A useful overview of further steps can be found, for example, on the websites of the *Aktion Mensch* Initiative for an Accessible Internet [1]. *Adobe* provides a detailed manual for creating accessible PDF documents with *Acrobat* [2]. *axesPDF QuickFix* also has detailed instructions [3]. Since *Office* 2010, *Microsoft* has integrated an accessibility check into the *Word, Excel* and *PowerPoint* products [4].

[1] Easy For All: PDF-Documents - Readable For All. Part 3 (German)

[2] Adobe: Manual for Creating Accessible PDFs.

[3] axesPDF: axesPDF QuickFix – QuickStart-Guide

[4] Microsoft Office: Improve Accessibility With the Accessibility Checker

Download the brochure in PDF format at:

https://tu-dresden.de/agsbs/dokumente