End-User Testing of PDF Documents Using JAWS and NVDA

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End-User Testing

This tutorial will guide you on using the two most popular screen readers as part of a quality assurance process for tagged PDF documents.

I've left some white space at the bottom of some pages for notes you might want to take on a printed tutorial version. I've allowed low-resolution printing of the tutorial, and for those who wish to take virtual notes, I've allowed commenting On the digital version.

Keyboard commands are provided only for those who want to dive into the adoption of keyboard commands. As we move through the quality assurance process with JAWS and NVDA, we will include strategies for using keyboard commands. You don't need to know all the keyboard commands…just the ones you'll use for testing.

The first step doesn't require adaptive technology.

The first step is to go down the tags Tree for the document. Use the Up and Down Arrows to move from Tag to Tag and the Left and Right Arrows to open and close Tags to verify content. Highlight Content is turned on by default. As you move Up and Down the tags Tree, you'll see the corresponding content highlighted in the document.

By the time you reach the part of the quality assurance process where you are using adaptive technology, you will have completed three significant components of a quality assurance process:

1. You will have made sure that the PDF document is tagged.
2. You will have made sure that the Tags are correct for the type of visual representation of the content that appears on a page/in the document.
3. You will have ensured that all content on the visual representation of the page/document that needs to be tagged has been tagged.

You will need to go into the Document Properties (Ctrl + D) and confirm the document title, the core language for the document and that the document title will be displayed when the document opens. You can also launch the Document Properties dialog from the File Menu.

If you have some content in a different language, review the properties of that Tag to ensure that the language change is included.

You can circumvent the error for Tab Order by going to the Pages Panel in the Navigation Pane and selecting all pages using Ctrl + A. With all the pages selected, right-click or press AppKey and choose Properties (at the bottom of the menu). In the Page Properties dialog, ensure that Tab Order (used for links and form controls only) is set to use the page structure.

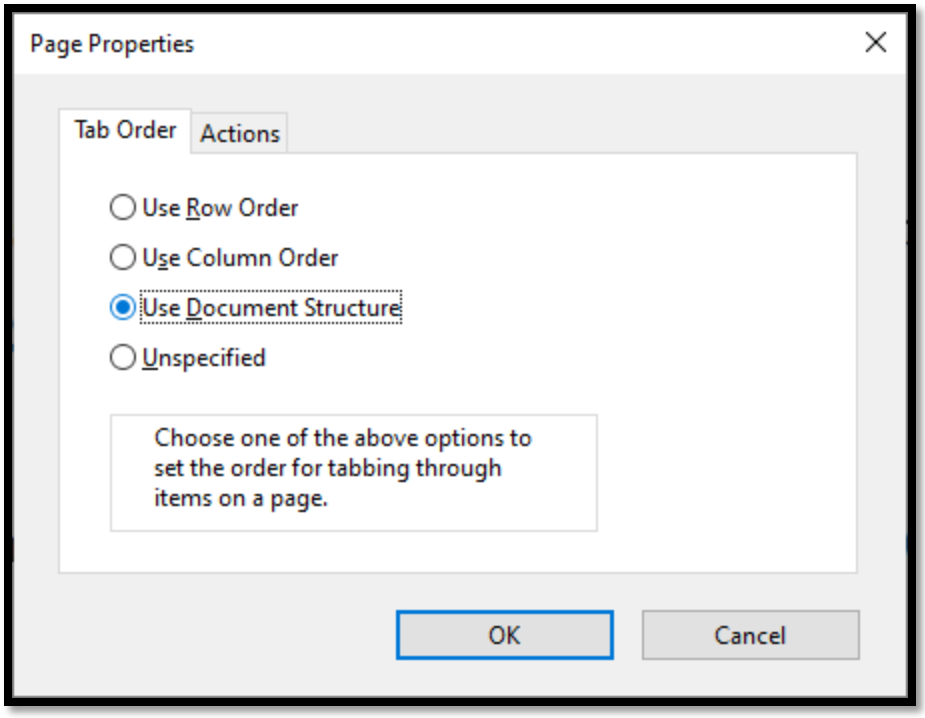

Figure 1 Page Properties dialog showing the "Use document structure" setting.

Once you've eliminated the items that might be flagged by an automated checker and have used the Adobe Acrobat Accessibility Check to review the document, you can start testing with adaptive technology.

Best Practices

This document will guide you through some principles, techniques, and steps to perform quality assurance or quality control for optimally accessible PDF documents.

The document is designed to be both an information and background resource and a tool to create a strategy and process for ensuring that PDF documents meet a standard and consistent level of accessibility. Tips are provided on how to use both the JAWS and NVDA (Non-Visual Desktop Access) screen readers. There is also information on the terminology used throughout this document and summaries of keyboard commands that can be used to perform user testing.

Establishing a uniform and consistent methodology for performing user testing is essential so that everyone is testing for the same thing and using the same process. Suppose user testing is done randomly with no setting, process, or accountability standard. In that case, the results can be random, undocumented, and challenging to track down and may represent an ineffective or confusing series of "errors."

As testing is performed, each step and element tested can be documented and confirmed using an Excel workbook that includes the document's name, the date the document was tested, the elements tested for and the name of the person who tested the document. If

necessary, when barriers are found, details of the steps to reproduce the barrier and any end-user settings must be provided so that the barrier can be found and identified.

One of the problems with user testing that does not have a strategy, process or procedure is that we often hear, "the tables aren't reading correctly." This type of comment does not indicate which tool was used to attempt the table reading, whether the table reading and navigation commands were being used, or whether the person was reading the table using standard non-table reading and navigation commands. This type of vague reporting does not tell if the person was using a PDF viewer that supports Headings, lists, tables and Alt text for images or what device they were using.

A detailed step-by-step description of what the tester did when the barrier was encountered provides valuable information and saves time tracking issues. It is a good idea to create a template for a "bug report" that lets you fill in this information if someone sends you an e-mail with a problem or one of the end-users testing your documents encounters a problem. Having a template with a consistent list of the things you need to troubleshoot saves time.

Barriers can be repaired and documented so that an organisation knows that the PDF documents they publish have met the standard, are compliant and that the users testing the documents have accessed the content using the correct techniques for adaptive technology such as screen readers or Text-to-Speech tools.

This is of great assistance if someone opens the PDF document and reports problems or barriers to the content. Having them identify what they were trying to do, what part of the document they were trying to read and what specific keyboard commands they were using can provide insight into whether the problem is related to end-user inexperience. An organisation can quickly refer to that document's documentation to see if the document element was flagged and repaired.

For example, if someone reports no headings in the document, knowing that they were using Read Out Loud is immediately helpful. "Read Out Loud" has no tools for identifying headings. Suppose they were using a specific TTS or screen reader, knowing the name of the adaptive technology. In that case, the versions of it and Adobe Reader and any user settings can provide insight into barriers. Above all, the documentation clearly states that elements have been tested and met the organisational standard for accessibility and compliance.

When a discrepancy is found, go back to the Tags and verify that the Tags are correct. Adaptive technology can vary in its support for PDF structure elements and PDF documents themselves. Examining the Tags and Tag properties is the starting point of troubleshooting.

Remediation Services

Just before the update of this tutorial, I was asked to review an "accessible PDF" that was remediated using one of the more extensive remediation services available. The PDF was unreadable. When I listed the problems for those of us using screen readers and then the barriers for those of us using screen magnification either with TTS or screen reading, and then listed the obstacles for those of us with learning disabilities using TTS tools that highlight text as you go, the response I got was "you want perfection, and no one is going to pay for that. The best you can expect is about 80% access". The only way anyone using adaptive technology would be able to read the document, according to these "remediation specialists", was to turn on SayAll and just let the 250-page document dribble and drone on without focus moving from the first page.

The message was clear. Those with disabilities should not expect any level of accessibility other than simple "access to the content". We shouldn't expect to be able to navigate to a heading and begin reading at that point in the document. We shouldn't expect to be able to find a link and activate it. We shouldn't expect to be able to move through a document paragraph by paragraph, word by word, character by character, or to have a character read using the Alpha, Bravo, Charlie method if we don't understand the word or don't understand what the pronunciation should be. We can open the document…what more do we want?

This type of ablism continues to oppress those of us with disabilities, denying us the ability to get an education, denies us the ability to be employed, participate in civic activities, access user manuals for our appliances or find out about social, religious, or recreational activities in our community.

One of the things to look for in documents remediated from one of the remediation houses is that the ability to highlight is not available in the document's text. This is typically a sign that the Actual Text attribute has been used instead of correctly tagging the PDF document. Highlighting of content will not be visible when reading Alt Text or Actual Text. In my 20+ years of PDF remediation, I only encountered using Actual Text when I demonstrated how and when to use it. In the past six months, I've encountered at least 8 PDF documents where all or a majority of the PDF had the Actual Text attribute on the document's text. The correct solution would be to OCR the text and then work on the Tags.

When the client I reviewed the PDF for repeatedly asked for an accessible version as per the contract and "guarantee", they were consistently bombarded with automated testing tool results stating that the document was "accessible" and refused to make it accessible.

Actual Text is ONLY used when the document's text is an image of text, and you can't take the PDF through an Optical Character Recognition (OCR) software such as ABBYY FineReader or OmniPage Pro. Do not use the Scan and OCR tools in acrobat.

In summary, the barrier created by the excessive use of the Actual text attribute is:

1. Screen readers cannot highlight the text as it is being read. Screen readers are used by those who use screen magnification and sometimes by those with learning, cognitive or other print disabilities. We must have access to the ability to highlight text as we read.
2. Text-to-Speech tools will stop reading when someone must change tools from a regular reading tool to a "read the picture of text" tool. Some of us who use screen magnification with Text-to-Speech tools and those with learning, cognitive or other print disabilities need a consistent flow of content to provide context and comprehension. If we are in the middle of a thought or concept and must switch reading tools, our focus and understanding are affected.

I've started a web page to demonstrate the difference between "access" and "accessibility. The Digital Access versus Accessibility[1] page can be found on the Karlen Communications website.

As a final comment on this topic, for now, consider going to a bookstore and buying a book only to be told you had to read it with the book held upside down at 20 paces from the page or that pages x, y, z, parts of pages a, b, c were missing. Some of the paragraphs on some of the pages might not be in a logical reading order…but you can't expect perfection…publishers just aren't going to give you an entire book in a logical reading order…it costs too much.

Now consider your ability to learn if that were your textbook.

Consider how you would do your job if this were a document necessary to perform the duties of your position…and how long you would remain employed.

If we use a remediation service, we must know what an accessible PDF is and how to check it. We can't rely solely on the word of anyone remediating content on our behalf that the content is accessible. We can't define accessible digital content as something that passes an automated checker. A percentage of the content we get back must go through a quality assurance process! I say that with the expectation that the work I submit as being accessible is included in this type of review.

[1] Digital Access versus Accessibility, Karlen Communications website: https://www.karlencommunications.com/AccessVersusAccessibility.htm

Screen Readers

Screen readers were developed for people who are blind so that we could use the computer. A screen reader "echoes" back everything we do on a computer. This capability depends on the user interface, operating system and digital content being accessible as possible at any time. If one of these components is not designed and implemented to be accessible, there is a barrier to accessing digital content by those using adaptive technology.

Of course, there are verbosity settings so we can modify the amount of information we hear. If someone is using a refreshable Braille display, they often turn off speech and access information on the screen through the refreshable Braille display. Screen readers and refreshable Braille displays are also used by people who are deaf-blind.

Figure 2 Refreshable Braille displays.

Text-to-Speech or TTS

Text-to-Speech tools, or TTS, are software similar to a screen reader but do not have as much support for the user interface as a screen reader does. While a screen reader must be able to read all parts of a screen, a TTS tool is primarily used for reading the document. People with learning, cognitive or visual disabilities typically use a TTS tool rather than a screen reader.

TTS tools often have supports like highlighting, creating a vocabulary list, a picture dictionary and highlight-as-you-read tools.

One of the most popular TTS tools is Read & Write from TextHelp.[2]

[2] TextHelp, Literacy, Accessibility and Dyslexia Software: https://www.texthelp.com/en-us

ZoomText[3] and Fusion[4] from Freedom Scientific (the JAWS folk) are screen magnification software with TTS (ZoomText) or screen reading (Fusion) support.

> **Note:** The Read Out Loud tool that ships with both Adobe Acrobat and Adobe Reader is **NOT** a tool that should be used to access PDF documents or to test them. Read Out Loud was introduced in Acrobat and Reader 6 to give people "an idea of what it might be like to hear a document read to you" but was **NEVER** intended to be either a complete TTS tool or a screen reader, nor was it intended to substitute for either of those adaptive technologies. Read Out Loud has not evolved since its addition to Adobe Reader and Adobe acrobat. It reads either all the document or a page of the document. It cannot provide information on the more granular structure elements of a tagged PDF. **DO NOT USE READ-OUT-LOUD**!

PDFs in Browsers and User Testing

Edge, Firefox, and Chrome all ignore user settings in a PDF viewer. For example, I have Adobe Acrobat Pro DC set to use Adobe Acrobat Pro DC as my default PDF viewer. All browsers ignore this and open a PDF in the browser instead of the stand-alone PDF viewer application.

This creates a considerable accessibility barrier and negates my preference regarding how I view and interact with PDFs. It is a lawsuit just waiting to be launched.

When a PDF opens in a browser, I am not notified that the PDF is a scanned image or has no Tags. I can't use any of the tools available in a stand-alone PDF viewer to improve my experience at viewing and interacting with PDFs.

Another barrier is that the ability to save or download the PDF to be viewed in a more accessible environment is often difficult or impossible to find. There are times when it is also not accessible. Hearing a screen reader tell you that you are using an Adobe add-in or plug-in for the browser is not good enough! You still can't view the Tags, Order or Content Panels, nor do you have access to an accessibility checker or other tools.

In other words, it is a crap shoot.

When testing PDFs related to accessibility, always use a stand-alone PDF viewer like Adobe Acrobat Pro DC or Foxit PDF Editor 16. I don't recommend using Kofax PowerPDF at this time (2022). After Kofax acquired the printing and scanning tools from Nuance, the ability

[3] ZoomText from Freedom Scientific: https://www.freedomscientific.com/products/software/zoomtext/

[4] Fusion from Freedom Scientific: https://www.freedomscientific.com/products/software/fusion/

to Tag a PDF regressed. Everything is either a <P> Tag, a <Figure> Tag or a <Table> Tag. Even when using an accessible word document, lists and headings are ignored in favour of a <P> or Paragraph Tag.

Always download the PDF or open it directly in a stand-alone PDF viewer.

You want to test PDFs in a tool that gives you access to the Tags Tree, Content and Order Panels and other tools to investigate elements in more detail. Viewing PDFs in a browser for quality assurance is not performing quality assurance or detailed end-user testing.

Keyboard Command Terminology

The following are terms you may need to become more familiar with related to adaptive technology, such as screen readers and the keyboard commands used to obtain information from documents.

The following image is of a standard Windows keyboard showing the various parts of the keyboard. People who are "mouse-dependent" often don't realise what some of the "extra" keys on their keyboard are or how they are used by people who do not use a mouse. The following image is meant as a refresher.

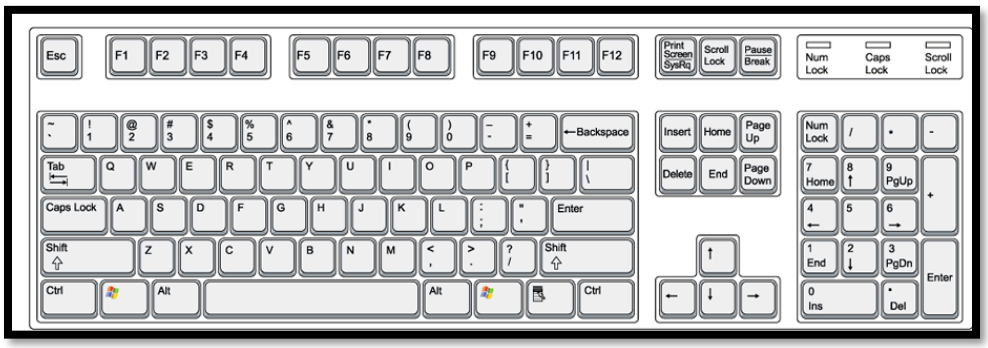

Figure 3 Standard Windows keyboard.

AppKey

The key on a standard keyboard with the picture of two application windows is the Application Key or the "AppKey". Pressing this key is equivalent to the right mouse click.

Figure 4 The AppKey is shown between the Windows and Ctrl keys on a standard keyboard.

The AppKey is typically located on the right side of the main keyboard area between the right Alt key and the right Ctrl key (sometimes the right Windows key and the right Ctrl

key). Its location may differ on a laptop, and some laptops do not have an AppKey. The preceding image shows the AppKey between the right Windows Key and the right Ctrl key on a standard keyboard.

The keyboard Command Shift + F10 on a Windows computer can be used instead of the AppKey; however, this keyboard command does not work in all places in the Windows ecosystem. If your computer has an AppKey, use this key instead.

Arrow Keys

The Arrow keys move through the content character by character or word by word. The Arrow keys are typically located between the main keyboard area and the NumPad on a standard keyboard. On most laptops, they are in the lower right of the main keyboard area. They are usually configured as what can be described as an upside-down letter T.

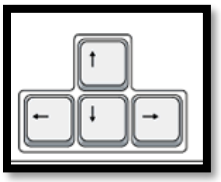

Figure 5 Arrow keys in a standard configuration.

They can be used on their own as follows:

- Press Left Arrow to move to and read the previous character.
- Press Right Arrow to move to and read the next character.
- Press Ctrl + Left Arrow to move to and read the previous word.
- Press Ctrl + Right Arrow to move to and read the next word.
- Press the Up Arrow to move to and read the previous line.
- Press the Down Arrow to move to and read the next line.
- Press Ctrl + Up Arrow to move to and read the previous paragraph.
- Press Ctrl + Down Arrow to move to and read the next paragraph.

The JAWS screen reader has additional keyboard commands using the Arrow keys to read sentences; however, these are broken in JAWS 2022 and JAWS 2023:

- Press Alt + Up Arrow to move to and read the next sentence.
- Press Alt +Down Arrow to move to and read the next sentence.

Keep testing these keyboard commands to note when they start working again. (Update November 2022: Apparently, it is just my computer that these keyboard commands don't work. I canvased the community, and no one else is having this difficulty. Another tip in end-user testing – know what a problem with the adaptive technology is and what a problem is with the content or PDF viewer.)

JAWS also adds the following keyboard commands to reread a paragraph or sentence:

- Press Ctrl + NumPad 5 to read the current paragraph.
- Press Alt + Numpad 5 to read the current sentence.

Both keyboard commands will move you to the beginning of the current paragraph or sentence and start reading it.

Function Keys

The JAWS and NVDA screen readers use the function keys to provide lists of information in PDF documents. JAWS also use the function key-based keyboard commands for the same functionality in Word or on a webpage. The Function keys are located at the very top of the keyboard to the immediate right of the Escape key.

Figure 6 Function keys above the main keyboard area, including the Escape key on the left.

One of the strategies for using the Function keys on a standard keyboard is to get used to feeling them. They are usually in groups of four keys that can be easily distinguished by a "gully" between them. For example, F1 through F4 is followed by a space or gully. F5 through FF8 are followed by a space or valley, and F9 through F12 are followed by a space or valley. After F12, there is usually a group of three keys: Print Screen, Scroll Lock and Page Break. We won't use any of these last three keys, so you don't have to worry about them.

Here is why using this strategy can save you time:

- JawsKey + F3 allows you to identify what list of elements in the PDF document you want to see in a list. For example, you could choose to see a list of graphics, tables, lists or list items.
- JawsKey + F4 opens a dialog to quit JAWS.
- JawsKey + F5 gives you a list of form controls/fields in a PDF document.
- JawsKey + F6 gives you a list of headings in a document.

- JawsKey + F7 gives you a list of links in a document.

Feeling the space between F4 and F5 gives you a point of reference for using the Function keys without looking at the keyboard.

> **Note:** On the Microsoft Natural Ergonomic 4000 Keyboard, there is a space between F5 and F6. There is also an F13 key which toggles the Function keys from the mode that screen readers or adaptive technology uses and a different mode. If you use a Microsoft Natural Ergonomic 4000 keyboard and find the Function keys aren't working, press F13 and try them again. This keyboard is no longer available as of 2021. Check the layout of your keyboard to find its quirks.

JawsKey and NVDA Key

The JawsKey is the Insert key on the Numpad with the NumLock off. The NVDA key is the Caps Lock key. The NumLock is located in the upper left of the NumPad and has a light indicator when turned on. Both screen readers will announce whether the NumLock is on or off. The JawsKey and the NVDA key are used for keyboard commands specific to the JAWS or NVDA screen reader. For example, press JawsKey + F6 for a list of headings, JawsKey + F7 for a list of links and Ctrl + JawsKey + T for a list of tables. Press NVDA key + F7 for an elements list of either Links or Headings.

Figure 7 Image of the NumPad on a standard keyboard layout.

On a laptop computer, there may not be a NumPad. JAWS and NVDA have specific laptop keyboard commands that can be used. By default, JAWS and NVDA will use the desktop keyboard command layout. You will need to change the keyboard configuration to a laptop and learn the laptop keyboard commands to use this layout. This book does not cover laptop keyboard commands.

On the other hand, you can still use the desktop keyboard commands with Arrow Keys to perform many of the testing activities. For example, using Ctrl + Left, Right, Up, or Down

Arrow will do the same thing as on a desktop layout. Pressing the JawsKey or NVDA key + Up Arrow on a laptop in desktop mode will start the SayAll command. Depending on the keyboard commands you want, you may not have to switch keyboard command layouts when using JAWS, NVDA or other adaptive technology. However, it is good to know that this is available if you want to use it.

Do NOT use the mouse.

Do NOT use the mouse to perform user testing. Wait to click on parts of the document and get the screen readers to follow you! Use the keyboard commands for the screen readers.

And the most important thing is to "listen" and not assume that just because you hear babble from the screen reader and Text-to-Speech tools, they are reading the information correctly.

Read Out Loud (TTS)

Do not use the Read Out Loud tool with Adobe Acrobat or Reader.

First, it is a very basic Text-to-Speech tool with no capability to identify headings, lists, tables, or other structural elements. It has remained the same since its inclusion with Acrobat or Reader 6.

Second, the only options are to read the entire document or the current page. This does not allow for testing of more granular navigation and reading, such as reading an individual paragraph, line, word, or character. This is not how people with disabilities read documents. We read using tools for accessing the document, page, paragraphs, headings, lists, tables, and other document elements.

For people with learning, cognitive or visual disabilities, the inability to go back through content and re-read a character, word, line, or sentence is a barrier to accessibility because it prevents comprehension and understanding of the content.

The third reason for not using Read Out Loud is that it can only use the installed synthesiser and synthesiser languages available to Narrator. This means that if the document is multi-lingual, the person using Read Out Loud will not experience language changes, which is another barrier to accessing the document/content.

Refreshable Braille Display

A refreshable Braille display for a computer uses 8 dots instead of the usual 6 for each character. This is known as computer Braille. As a screen reader reads content or focuses on a line of content, the characters are shown on a Braille display attached to a computer or handheld device such as an iPhone or iPad.

Computer Braille uses the standard 6 dots for characters as "regular' Braille and uses the other 2 Braille cells for formatting information about the current character or word. For

example, if the text is a heading, this might be conveyed using the other 2 Braille dots or pins on a refreshable Braille display.

The Braille displays are “refreshable” because the Braille cells change depending on the characters currently being read. The “dots” or pins in the Braille cells move up or down as someone moves through the content. Refreshable Braille displays also have controls so that the person using them can modify how the content is being read and how they navigate through the content. Many people who are blind use refreshable Braille displays with their screen reader because they can access information such as accented characters in addition to formatting. For students, this is important because they can explore the content in a more detailed manner than by just listening to it. For those in business or who are reading for information, being able to examine the details of spelling helps with making notes or referencing content if they need to follow up on anything.

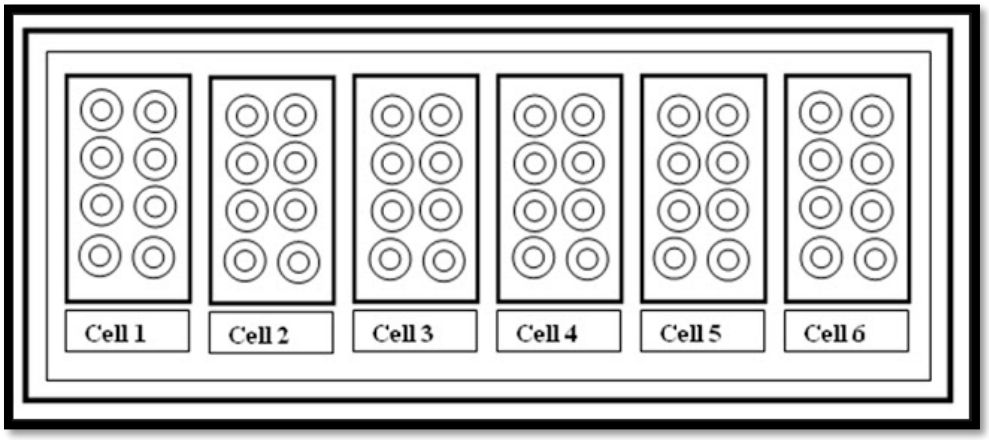

Figure 8 Image of computer Braille cells.

The preceding image shows individual computer Braille cells. The top 6 pins in each cell are for the characters, and the bottom two are for any formatting or additional information about the characters. The “dots” or pins “rise and fall” with each character being read.

Refreshable Braille displays come in 8-cell, 12-cell, 40-cell and 80-cell models. Eighty cells represent the number of characters on one line of a page, 80 characters. Using this as a measure, one can easily see that although a 6 or 12-cell refreshable Braille display might be portable, it will take longer to move across a line of text and read it. This is an important reason to ensure that content in a PDF document is tagged, tagged correctly and to a standard such as PDF/UA. As someone using a refreshable Braille display moves across the line of text on a page, it is easy to identify a flow and consistency of information if a standard tagging method is used.

Six Pack

Those who use the JAWS screen reader or other adaptive technology fondly refer to the group of six keys above the Arrow keys and between the main keyboard and the NumPad as the “six-pack.” These keys are:

- Insert Home, Page Up on the first row of the six-pack.
- Delete, End and Page Down on the second row of the six-pack.

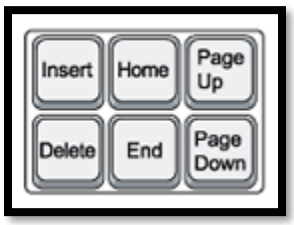

Figure 9 Six-packs of keys on a standard keyboard.

On a laptop computer, these keys may be scattered along the right side of the keyboard. They are often in a linear configuration with Insert and Delete at the top right of the laptop keyboard, and Home, Page Up, Page Down and the End Key arranged down the right side of the laptop keyboard just under the Delete key.

The following keyboard commands will help move through a PDF document:

- Press Ctrl + Home to take you to the top of the document.
- Press Ctrl + End to take you to the end of the document.
- Press Ctrl + Page Up to take you to the top of the previous page.
- Press Ctrl + Page Down to take you to the top of the next page.

Open the PDF to the Last Page

There is a setting in Adobe Acrobat or Adobe Reader to open the PDF document and put your position/focus on the last page you read. This can be useful if the document is long and user testing spans several sessions.

To turn this setting on or off:

1. Press Ctrl + K to open the Preferences dialog.
2. Press D for Document.
3. Press Tab to move to the first setting under the Document category.
4. Press Spacebar to either check or uncheck the option to “restore last view settings when reopening documents.”.

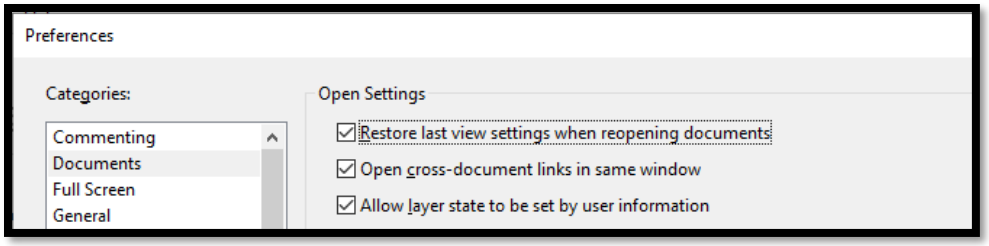

Figure 10 Document Preferences to restore the last view of the document.

The JAWS Screen Reader

JAWS, or "Job Access With Speech", is one of the most used screen readers. NVDA, or Non-Visual Desktop Access, is the other frequently used screen reader. Sometimes both screen readers are used with screen magnification when TTS support is insufficient. I use JAWS with or without Windows Magnify on a Windows desktop computer.

The JAWS screen reader provides more granular access to content in most document types and is a "professional" level screen reader.

For example, keyboard commands list headings, tables, lists, form controls and other document elements.

There are specific keyboard commands for navigating and reading through tables that let someone read the table either:

1. As part of the SayAll command, which reads the table without notification of column, row or cell information.

2. Ctrl + Up or Down Arrow reads each table row without column, row or cell information.

3. Using the table, navigating and reading commands which provide column, row and cell information for the current cell or cells surrounding the current cell.

    a. There are also JAWS commands for reviewing information in a column or row related to the current cell.

There are some initial setup tasks that you need to do to use JAWS for user testing. These settings are based on the fact that you might not be a person who uses a screen reader and may initially find the rate of speech difficult to follow.

The default speech synthesiser for the JAWS screen reader is Eloquence, an older non-natural phoneme voice. You can change it to a more natural-sounding voice if you have other synthesised voices installed on your computer. You can do this through the Voice Adjustment settings, which will be discussed later in this topic.

Note: Natural phoneme voices may not recognise symbols or some characters in documents. Also, note that some natural phoneme voices will pronounce words such as “wasted” as “was ted.” This is normal due to your chosen voice, not necessarily an error in the tagged PDF. If you come across this type of pronunciation, you will need to review the text in the Tags Tree or with the Eloquence synthesised voice to identify where the problem is. Eloquence has the most robust pronunciation dictionary.

JAWS Startup Wizard

Once you start JAWS for the first time, a Startup Wizard dialog will open and guide you through some basic settings. You can go back to the Startup Wizard and make changes at any time. The JAWS Start-up Wizard can be found in the Help Menu of the JAWS application if you need to reaccess it (JawsKey + J, H for Help and choose Startup Wizard).

Figure 11 JAWS Startup Wizard step 1.

The first step in the JAWS Startup Wizard is to choose to help Vispero by sending information about usage and crashes to them. There is a button to learn more about this process at this stage of the Startup Wizard. You can return to the Startup Wizard anytime by pressing JawsKey + J, H, Z.

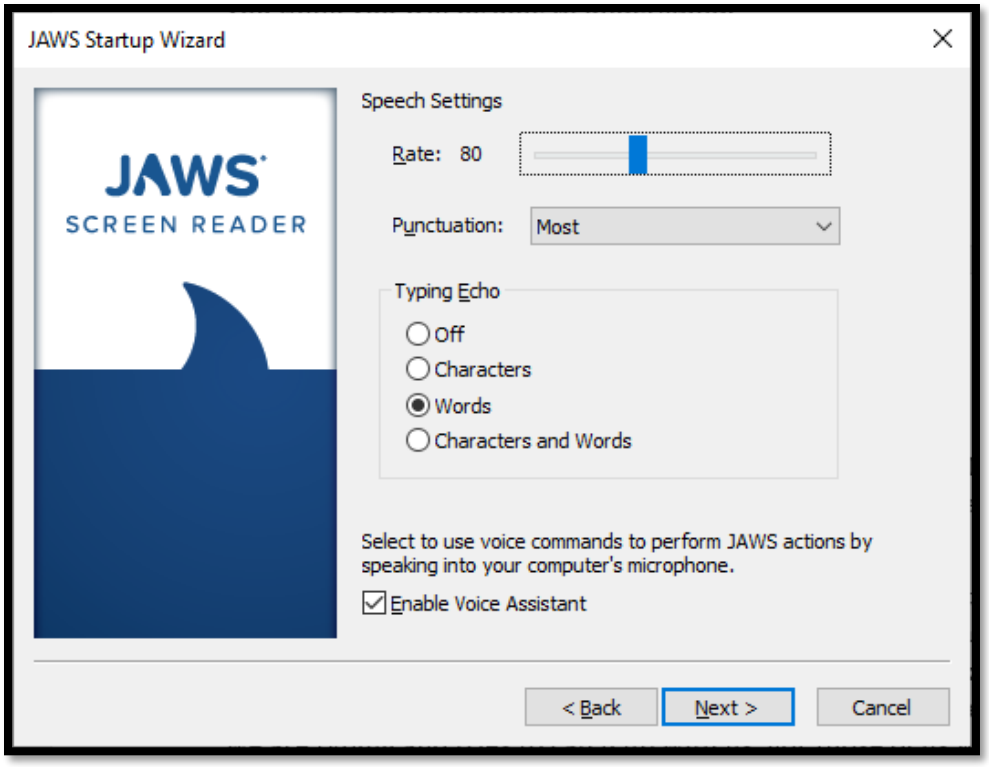

Figure 12 Speech settings in the JAWS Startup Wizard

The first setting in Speech Settings is the rate of speech. This will determine how fast or slow the screen reader talks. The default is 15 per cent. Use the Up or Down Arrow keys to move the rate faster or slower in small increments. Use Page Up or Page Down to move the speech rate faster or slower in larger increments. Press Tab once you have the speech rate you think you will be able to understand.

The following setting is Punctuation. Most of us have this set to Most. If we need to review the content in more detailedly, we can move through the text character by character or word by word, which reads the punctuation.

Press the Tab to move to the next setting in step 1. This is the setting for the typing echo. The default is character. Most of us have it set to Word. This means that after we press the Spacebar, we hear the word we just typed. Since JAWS has a "keyboard interrupt", as we type, if we type quickly, JAWS interrupts reading the current character we are typing and tries to catch up with us. For those of us who are fast keyboarders, the typing echo can be set to none. This means that there is no feedback until we ask for it.

The last setting allows you to use Voice Assistant to give voice commands to JAWS. This is checked by default.

Tab to the Next button and press either Spacebar or Enter. You could press Alt + N instead, which will also move you to the next step.

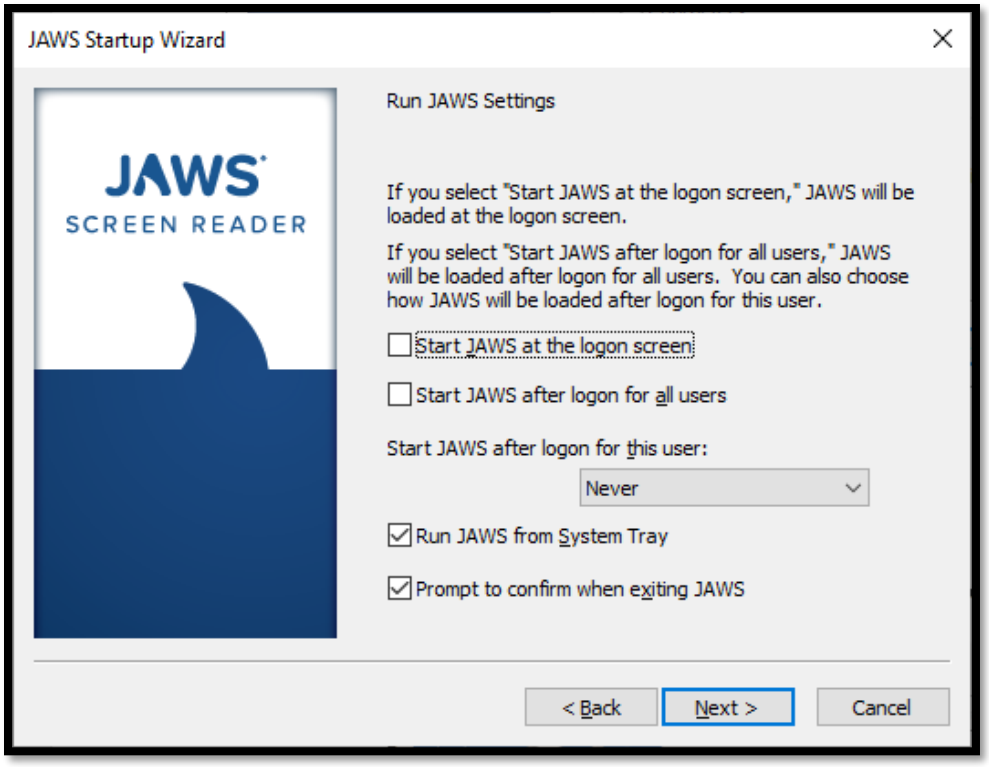

Figure 13 Run JAWS Settings in the JAWS Startup Wizard.

Step 3 lets you set how JAWS starts and where it is placed on the desktop. The first setting in the Run JAWS Settings is to have JAWS start on the logon screen of Windows. If you are not a person who uses a screen reader, uncheck this Check Box by pressing Spacebar.

Press the Tab to move to the next setting. This setting will start JAWS once you've logged in. This is not checked by default; you won't want to check it if you only use JAWS for testing.

Press Tab, which moves you to a list of options about starting JAWS after logon for this user. Change this to Never if you are not a screen reader user. You can change this setting by pressing the Down Arrow once you have focused on the list.

Press Tab to move to the last setting in the Run JAWS Settings. This setting is handy and recommended. When you start JAWS, it puts JAWS in the System Tray instead of the Taskbar. This gets it out of your way if you switch applications or use the Alt + Tab to move among open applications. JAWS will not be one of the applications you cycle through if you check this Check Box using the Spacebar. However, if you want to quit JAWS, you can press JawsKey + F4 to exit.

Tab to the Next button and either press Spacebar or Enter…or press Alt + N to activate the Next button.

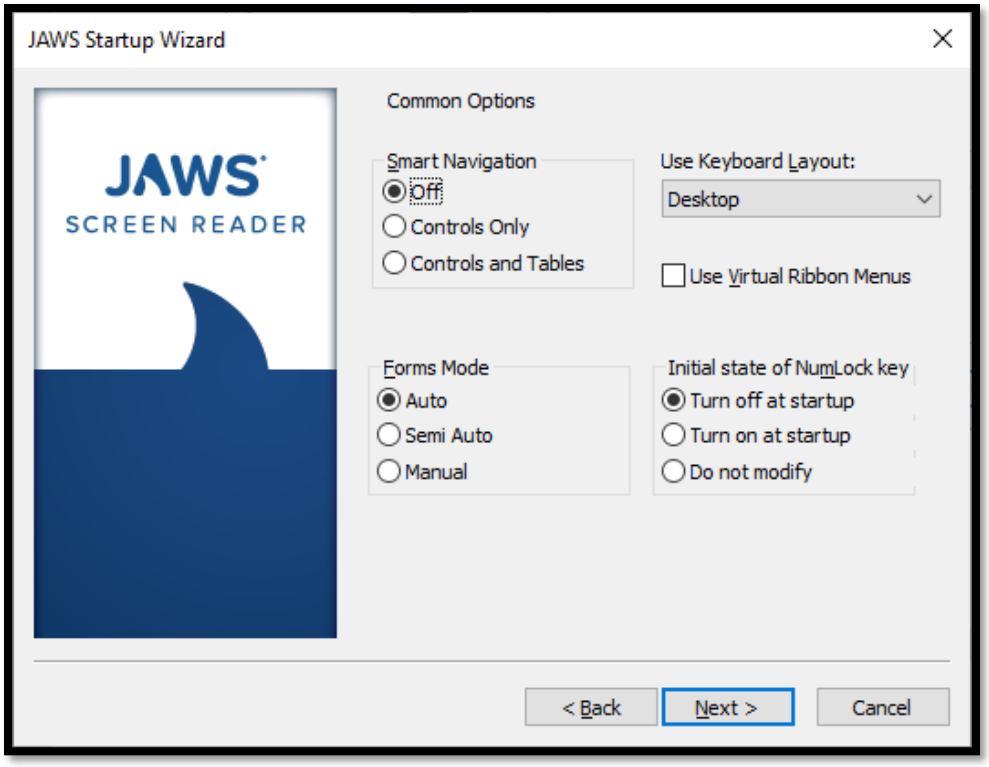

Figure 14 Common Options in the JAWS Startup Wizard.

In step 4, The first setting in Common Options is for Smart Navigation. It is turned off by default. Press the Tab to move to the next setting.

The next setting down is for Forms Mode, and you will want to keep that as Auto. Press the Tab to move to the next setting.

The next setting determines whether you use the desktop or laptop keyboard layout. When using JAWS, some commands are different if you use a laptop simply because the laptop keyboards are configured differently from the standard desktop keyboard. Press the Tab to move to the next setting.

The Virtual Ribbon setting is for Microsoft Office.

The Last setting in Common Options to note is that when JAWS starts, your NumLock will be turned off so that you can use the Numpad for any JAWS-specific keyboard commands. You can quickly turn it on when you need it by pressing the NumLock. The other option is to set it here to the state you want.

Tab to the Next button and either press Spacebar or Enter…or press Alt + N to move to the Next button and activate it.

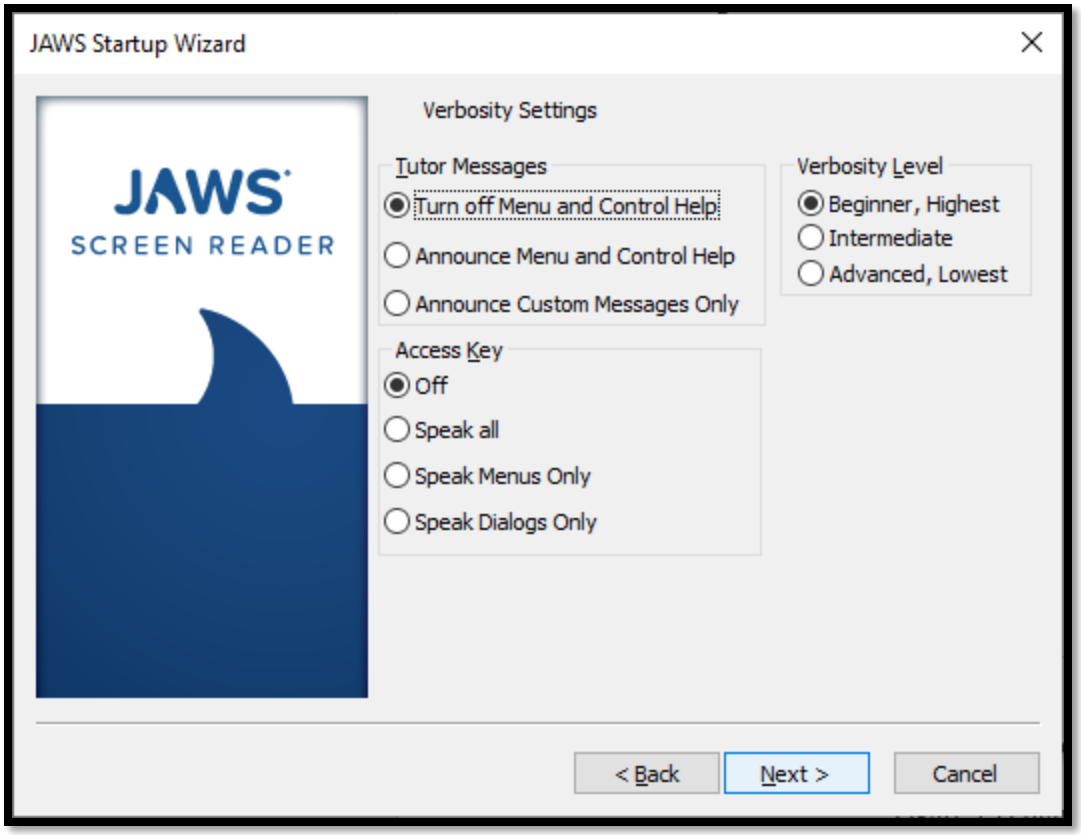

Figure 15 Verbosity Options in the JAWS Startup Wizard.

There is nothing to change in Verbosity Settings. As someone new to screen readers and testing quality assurance/compliance, you want to hear as much information as possible. Remember, you can always press Ctrl to stop speech.

> **Note:** I have the Tutor Messages and Access Keys turned off. I don't notice that much difference in the voicing I get.

Tab to the Next button and either press Spacebar or Enter…or press Alt + N to move to and activate the Next button.

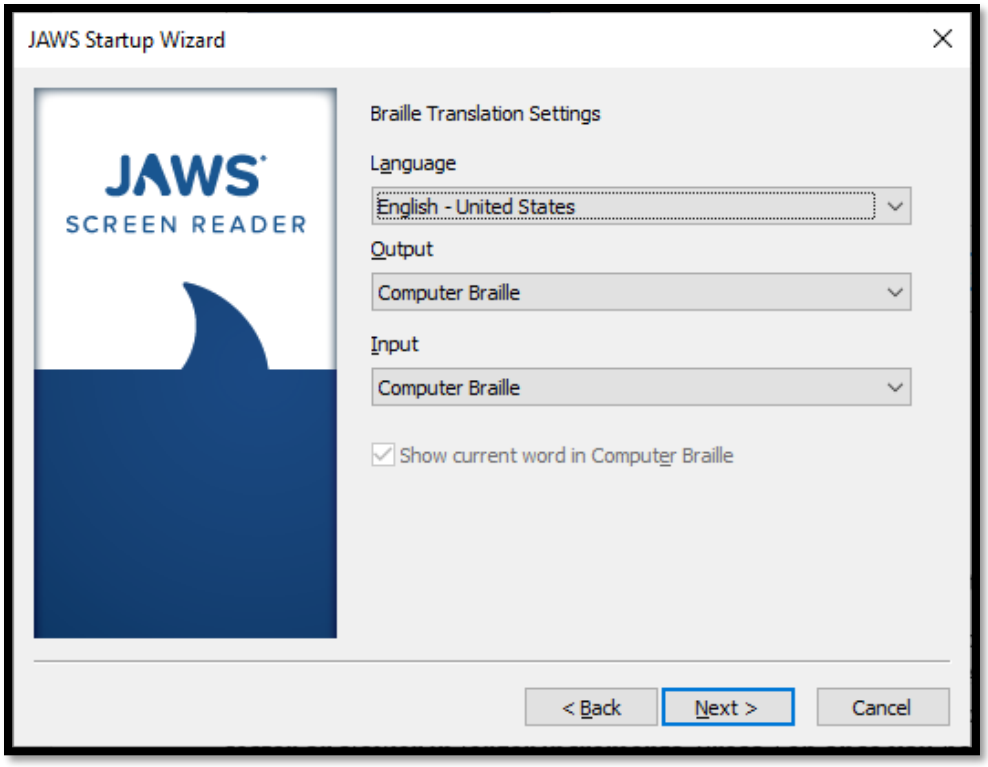

Figure 16 Braille Translation Settings in the JAWS Startup Wizard.

The Braille Translation Settings in the JAWS Startup Wizard allows you to set up any Braille Translation Settings if you use a refreshable Braille display. We will not use this for testing, but if you have testers who use refreshable Braille displays, ensure all their settings are catalogued and in their reports.

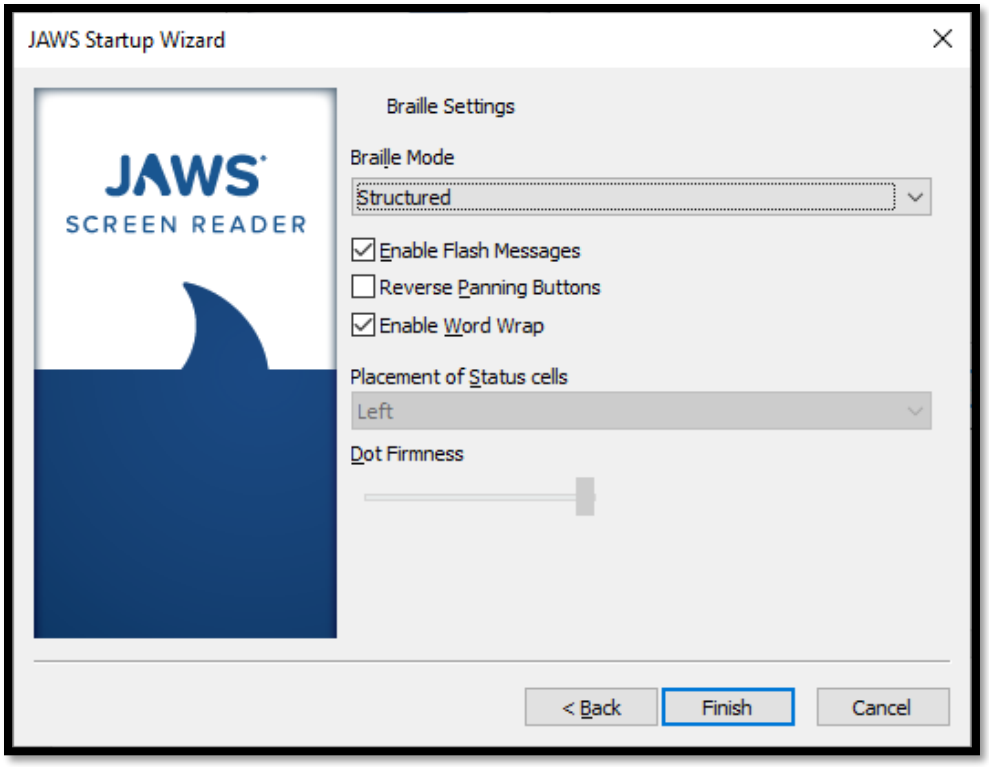

Figure 17 Braille Settings in the JAWS Startup Wizard.

The final step in the JAWS Startup Wizard is to set the Braille Structure settings. This does not need any action or changes. This is for those who use a refreshable Braille display with our computers. There is no keyboard command to move to and activate the Finish button. You need to Tab to it and either press Spacebar or Enter to activate it.

To access the Startup Wizard anytime, with JAWS running in the System Tray, press JawsKey + J, H for Help and Z for Startup Wizard.

JAWS Settings and User Testing

It is not recommended to modify specific settings for PDF documents when testing. In most cases, people using their adaptive technology at an intermediate or advanced level know that they can modify the settings of their screen reader.

This topic overviews what settings can be modified for PDF documents. In many respects, they are the same as HTML documents. Again, this is because we are in the “virtual view” of PDF documents as in HTML documents. Some verbosity settings do not apply to PDF documents because the file format/document format differs from HTML. The similarities are simply because we are in virtual cursor/mode while reading and navigating both formats.

To see the JAWS verbosity settings, press JawsKey + V. This opens a dialog.

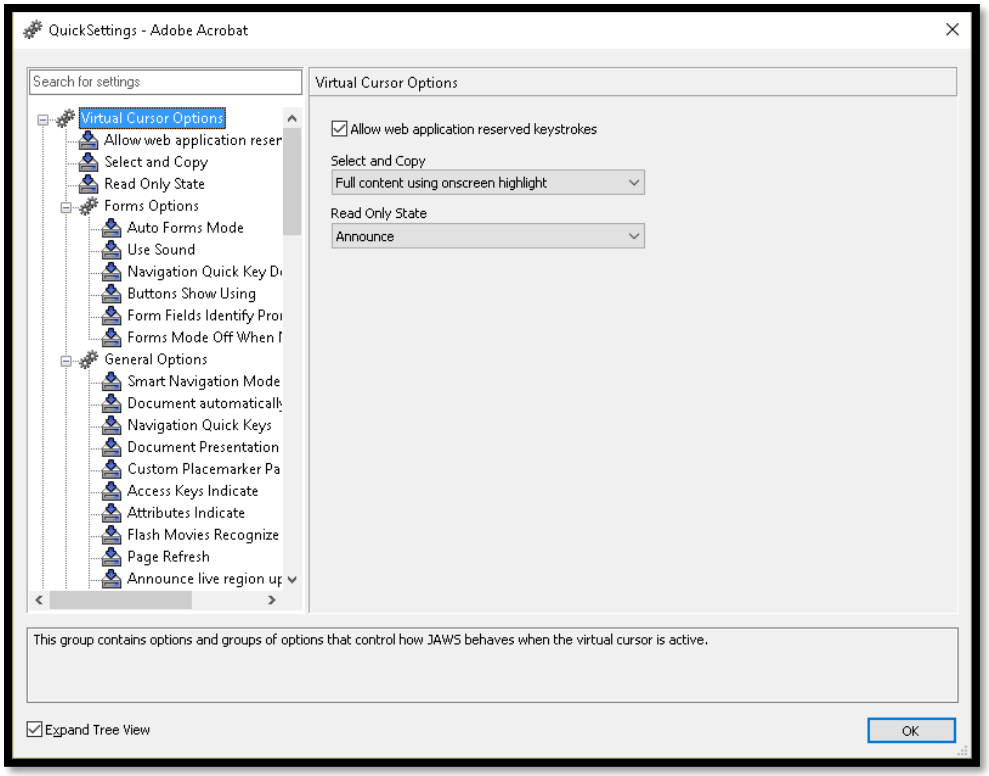

Figure 18 JAWS verbosity settings for PDF documents.

Focus is in the edit box, where you can type a setting to move to it quickly—however, press Tab to move into the list of settings to begin exploring them. Then use the Up and Down Arrows to move through the settings. The Up Arrow will move you to the previous setting; the Down Arrow will move you to the next setting. If you want to change a setting, press the Spacebar, we are not going to change any settings for quality assurance or compliance settings.

The first settings are for providing information using the Virtual Cursor. These are defaults that should be left as they are.

The first setting under the Virtual Cursor settings is to “Select and copy full content using highlight.” This is turned on by default. This setting will let you see what you are selecting as you select it. This is not the same as highlighting as you read. We’ll adjust that setting in a different place in the JAWS settings.

The second setting under Virtual Cursor is “Read-only state announced.” This is on by default. This lets someone using JAWS know that the document is “read-only” and should not be changed.

The next category of settings is for working with forms. The first setting is “Auto forms mode”, and the default is “auto”, meaning that once someone lands on a form control/field,

JAWS will automatically switch to Forms mode. We don't have to press Enter to turn on Forms mode.

The second setting is to use sounds to indicate form controls/fields, and this is checked by default.

The third setting is to delay the Navigation Quick Key response, and the default is "Never." This means that as soon as a quick key related to forms is pressed, there will be no delay in moving to the previous or next identified form control/field.

The next setting is "Buttons show using screen text", which means that JAWS will identify buttons using the text that appears on the screen if possible.

The next setting is "Form fields identify using label prompt Which means that JAWS will use the label of the form control/field to provide a prompt to the end user.

The last setting in this category is to turn off Forms mode when the page/document is loading. This lets JAWS provide other information to the end-user, such as how many headings, links or other elements are in the document. If the person is opening a form, it also means that they can read any instructional information before being taken to the first form control/field.

Under General settings, JAWS will start reading the document automatically once it loads, and Navigation Quick Keys are turned on by default. At any point, the ctrl key can be pressed to stop speech. I recommend turning this setting off. Sometimes it is confusing for novice screen reader users to suddenly hear a plethora of information coming at them at once. It can be overwhelming. As an end-user tester, you may also hear something that sounds correct but isn't during those first few seconds of opening a document.

For this reason, use the Spacebar in the JAWS verbosity dialog to turn the automatic reading of PDF documents off.

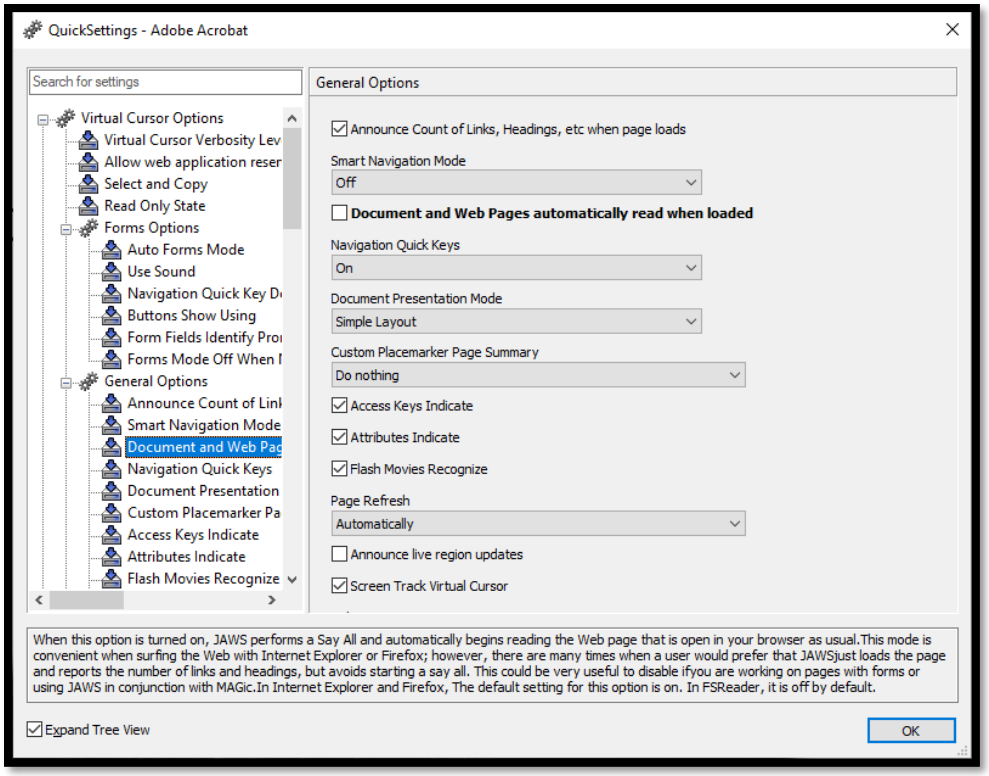

Figure 19 JAWS Verbosity settings showing Documents Read Automatically setting.

The other settings under the General category that are important to note are that the screen tracks the Virtual Cursor, and Link Activation is set to use Enter to simulate a mouse click.

Under the Text category of settings, the settings for abbreviations and acronyms are specific to HTML and are unchecked by default. This is how they should remain. The technique for rendering abbreviations and acronyms differs in the PDF environment from in HTML.

The other two settings under Text are to “Skip repeated text” and to identify the start and end of Blockquotes. There is a <Blockquotes> Tag, although the screen readers may not support it.

The default settings for Graphics are to “Show All” and to “Recognize by Alt Text”, neither of which should be changed.

As stated at the beginning of this topic, user testing should be done using the settings that are the default settings for whatever adaptive technology you are testing document access with. However, knowing the default settings and recognising the difference between what is read by default and any flaws in reading a PDF document is helpful. The settings to modify help you locate where the Virtual Cursor is on a page.

JAWS User Settings

In recent years some of the settings have been moved to more global JAWS settings. These can be found under the JAWS menu, Utilities, and Settings.

Of these, the most important is the ability to highlight whether you are using the PC Cursor or the Virtual Cursor as you read through the content.

To use the ability to highlight content as you read:

1. Press JawsKey + J to open the menu from the System Tray (lower right in the Windows Taskbar).
2. Press U for Utilities.
3. Press E for Settings Centre.
4. When the Settings Centre dialog opens, go to Visual Tracking. You can press V to move quickly to these settings. Other settings start with the letter V but pressing V will get you to Visual Display quickly.

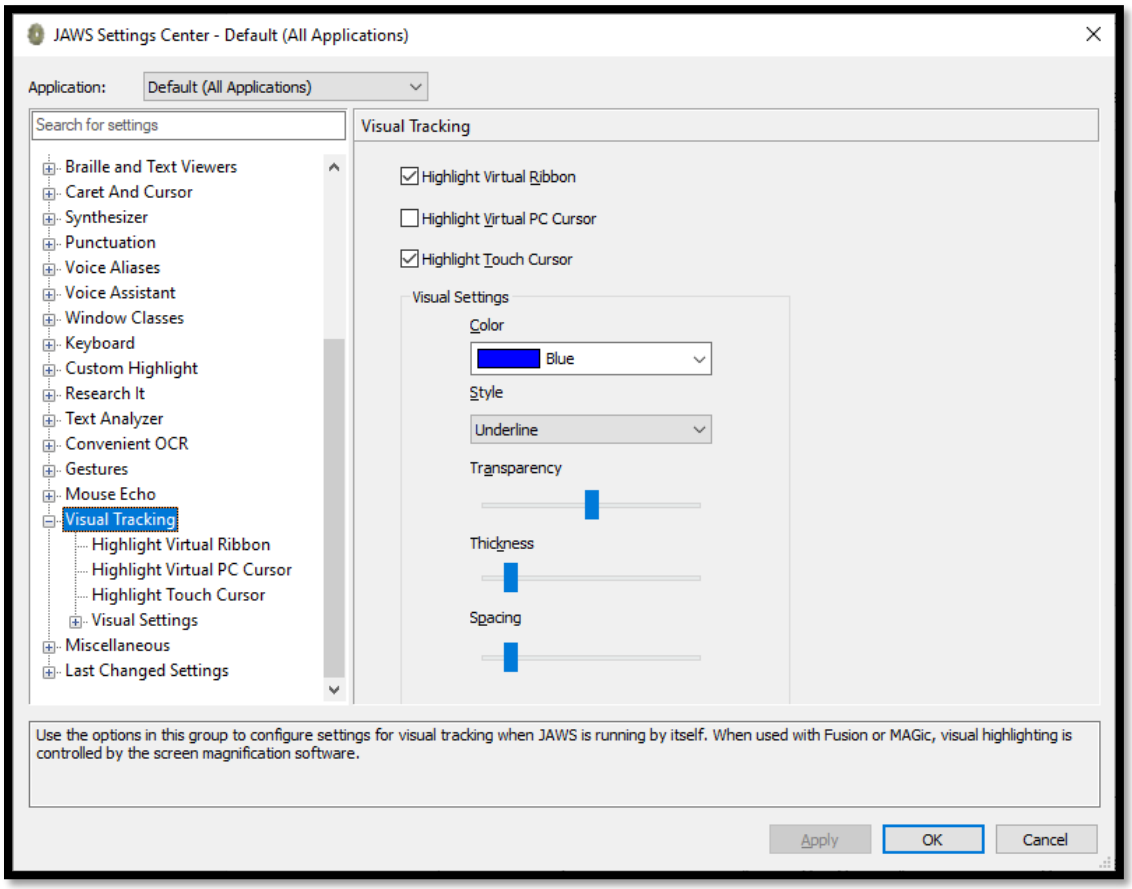

Figure 20 JAWS Settings Centre showing Visual Display Settings.

The default settings have the text highlighted in a red box. The preceding image shows the colour and highlighting I prefer. The highlight can be adjusted using several colour choices: the highlight's appearance, transparency, thickness, and spacing of the highlight from the text.

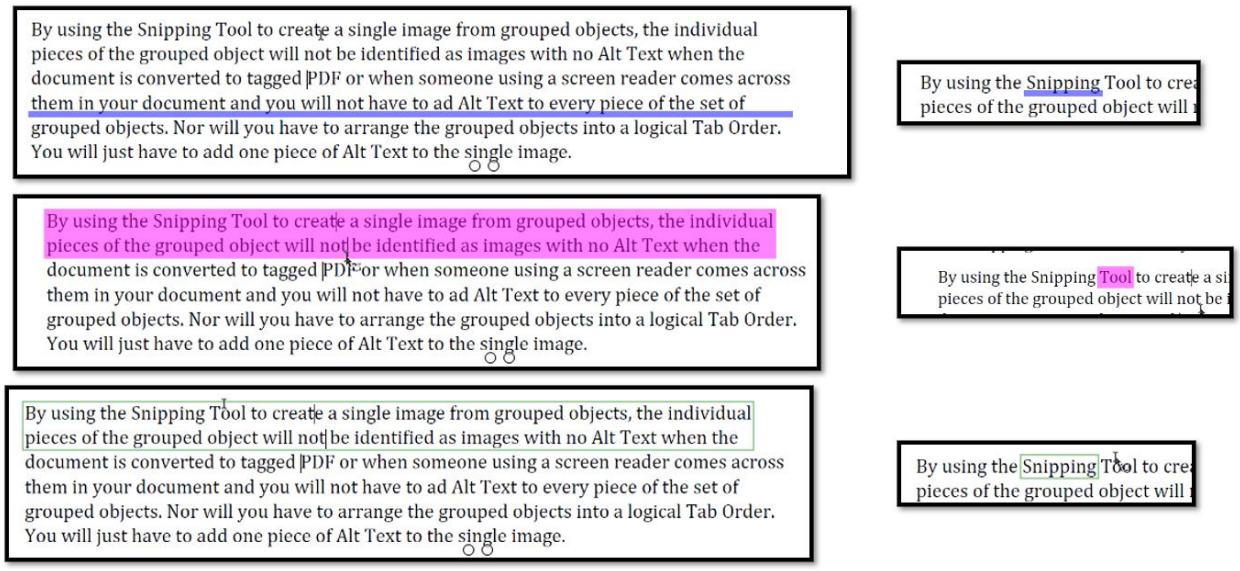

Figure 21 Samples of possible JAWS visual display highlight. Paragraphs on the left/words on the right.

As previously stated in this tutorial, if the text in the document has the Actual text attribute, you won't be able to see the highlight. This indicates that you need to check the Tag for that content and perhaps request or perform additional remediation.

JAWS Basics

The following are some of the basic keyboard commands used to control JAWS.

Stop JAWS from speaking	Ctrl
Right mouse click	NumPad Asterisk/Star

Adjusting JAWS Speaking Speed

When **NOT** using Say All (JawsKey + NumPad 2):

- Press Alt + Ctrl + Page Down to temporarily Decrease Voice Rate.
- Press Alt + Ctrl + Page Up to temporarily Increase Voice Rate.
- Press Alt + Windows Key + Ctrl + Page Down to permanently Decrease Voice Rate.
- Press Alt + Windows Key + Ctrl + Up Page to permanently Increase Voice Rate.

As you change the speed or rate of speech, JAWS will tell you whether it is speaking slower or faster.

When using the SayAll command (JawsKey + NumPad 2):

- Press Page Down to Decrease Voice Rate.
- Press Page Up to Increase Voice Rate.

Press JawsKey + S to restore the speech rate to the last saved setting (if you temporarily change the speech or use the SayAll command).

You could press the Alt + Tab to move to another open application to restore the last saved voice rate setting if you used a temporary voice rate/speed adjustment.

These keyboard commands only affect the primary language used for reading content. You shouldn't worry about primary or secondary languages; they are only mentioned here for clarification.

Changing the Synthesized Voice in JAWS

By default, JAWS uses the old Eloquence speech synthesised voice. Some people don't like it because it sounds a bit robotic. I use it because I can edit and write documents better. Some natural phoneme voices like Daniel, Heather, Kate, and Karen miss symbols and other characters because they are based on human speech, whereas Eloquence is not. Therefore those screen readers sound "more human."

To change the synthesised voice, press JawsKey + J, the letter O for Options, V for voice and Voice Adjustment is the first item in the context menu. (JawsKey + J, letter O, V)

You can choose from the synthesisers you have installed on your computer. You can also choose American English or British English if you stay with the Eloquence synthesiser. Eloquence will also change from English to another language if there is a change in the language in the PDF document…or other types of content.

Text/Navigation/Reading (JAWS)

The following are the basic keyboard commands for navigating a PDF document using JAWS. These are standard keyboard commands and can be used in most documents with JAWS. They can be used without JAWS, but the text won't be read…these are standard keyboard commands used by the JAWS screen reader.

Move to and read the previous character, Left Arrow

Move to and reads the next character	Right Arrow
Read current character	NumPad 5 with the NumLock off
Move to and reads the previous word	Ctrl + Left Arrow
Move to and reads the next word	Ctrl + Right Arrow
Move to and reads the previous line	Up Arrow

Move to and reads the next line	Down Arrow
Read the current line	NumPad 8 with the NumLock off
Move to and reads the previous paragraph	Ctrl + Up Arrow
Move to and reads the next Paragraph	Ctrl + Down Arrow
Read the current paragraph	Ctrl + NumPad 5 with the NumLock off

JAWS Quick Keys

The following keyboard commands can be used in the virtual view of a document (PDF or HTML). These keyboard commands can be used in addition to the general navigation and reading commands. Once JAWS has reached the end of the document, it will start from the beginning again. NVDA uses the same keyboard commands but will stop and tell you there are no more elements once you reach the end of the document.

Move to the next Heading.	H
Move to the previous Heading.	Shift + H
Move to the next List	L
Move to the previous List	Shift + L
Move to the next List Item	Letter I
Move to the previous List Item	Shift + letter I
Move to the next Table	T
Move to the previous Table	Shift + T
Move to the next Form Control	F
Move to the previous Form Control	Shift + F
Move to the next Graphic	G
Move to the previous Graphic	Shift + G

Tables (JAWS)

The following are keyboard commands when reading data tables or any table in a document.

It is essential to know that when using a screen reader, there are general text reading and navigation keyboard commands, table reading and navigation commands and keyboard commands for working with form controls.

List Tables	Ctrl + JawsKey + T
Move to Next Table	T

Move to Previous Table	Shift + T
Select Table	F8
Jump to Table Cell (from within a table)	Ctrl + Windows Key + J
Return to Previous Cell	Ctrl + Shift + Windows Key + J
Read Current Cell	Ctrl + Alt + NumPad 5
Move to and Read the Next Cell	Ctrl + Alt + Right Arrow
Move to and Read Prior Cell	Ctrl + Alt + Left Arrow
Move to and Read Cell above	Ctrl + Alt + Up Arrow
Move to and Read Cell below	Ctrl + Alt + Down Arrow
Move to and Read First Cell	Ctrl + Alt + Home
Move to and Read the Last Cell	Ctrl + Alt + End
Read Next Row	Windows Key + Alt + Down Arrow
Read Previous Row	Windows Key + Alt + Up Arrow
Read Current Row	Alt + Windows Key + Comma
Read from Beginning of Row to Current Cell	JawsKey + Shift + Home
Read from Current Cell to End of Row	JawsKey + Shift + Page Up
Read Current Column	Alt + Windows Key + Period
Read from the Top of the Column to the Current Cell	JawsKey + Shift + End
Read from Current Cell to Bottom of Column	JawsKey + Shift + Page Down
Read Next Column	Windows Key + Alt + Right Arrow
Read Previous Column	Windows Key + Alt + Left Arrow

Forms (JAWS)

The following keyboard commands are used when working with a PDF form that is accessible. I've added this caveat because if the form controls are made to be accessible, but the document author forgot to Tag the form, the form is not accessible.

List of Form Fields	JawsKey + F5
Enter Forms Mode	Enter
Exit Forms Mode	NumPad Plus
Move to First Form Field	JawsKey + Ctrl + Home

Move to Next Form Field	F
Move to Previous Form Field	Shift + F
Move to Last Form Field	JawsKey + Ctrl + End
Move to Next Radio Button	A
Move to Previous Radio Button	Shift + A
Move to Next Button	B
Move to Previous Button	Shift + B
Move to Next Combo List	C
Move to Previous Combo List	Shift + C
Move to Next Edit Box	E
Move to Previous Edit Box	Shift + E
Move to the Next Check, Box	X
Move to Previous Check Box	Shift + X
List Radio Buttons	Ctrl + JawsKey + A
List Buttons	Ctrl + JawsKey + B
List Combo Boxes	Ctrl + JawsKey + C
List Edit Boxes	Ctrl + JawsKey + E
List Check Boxes	Ctrl + JawsKey + X
Enter/Leave Multi-Select Mode	Shift + F8

The NVDA Screen Reader

The NVDA or “Non-Visual Desktop Access” screen reader is open-source. Its development and evolution depend on donations.

NVDA uses the CapsLock key in the same way that JAWS uses the Insert key on the NumPad. This is referred to as the NVDA key. I usually change the NVDA key to the Insert key, which I find less confusing since I use both screen readers (JAWS uses the Insert key on the Numpad).

As with the JAWS screen reader, you can have NVDA highlight text as you read. However, unlike the JAWS screen reader, there is only one choice when that option is chosen: a red box around a page in a PDF document. It also doesn’t always work when reading a PDF document. You need the focus Highlight extension installed to see where the focus is. Unfortunately, you can’t change the colour of the focus highlight, which is a light green and is difficult at times to see.

The default “NVDA key” is the Caps Lock key. I recommend changing it to the Insert key on the Numpad for two reasons:

- The keyboard command to start Sticky Key is to press the Caps Lock 5 times. The keyboard command when using NVDA and needing to turn the Caps Lock on is to press the Caps Lock twice quickly. If you lose track of how many times you’ve pressed the Caps Lock, you might inadvertently start Sticky Keys.
- You only need to know the one JAWS/NVDA key if you are using both to test with.

The ability to change the NVDA key in the Keyboard settings in the NVDA Preferences dialog.

NVDA Settings

To access the NVDA settings, press the NVDA key + N. This opens a menu on the screen. Choose Preferences to open the NVDA Preferences dialog.

The Speech settings are the second category in the Navigation Pane on the left.

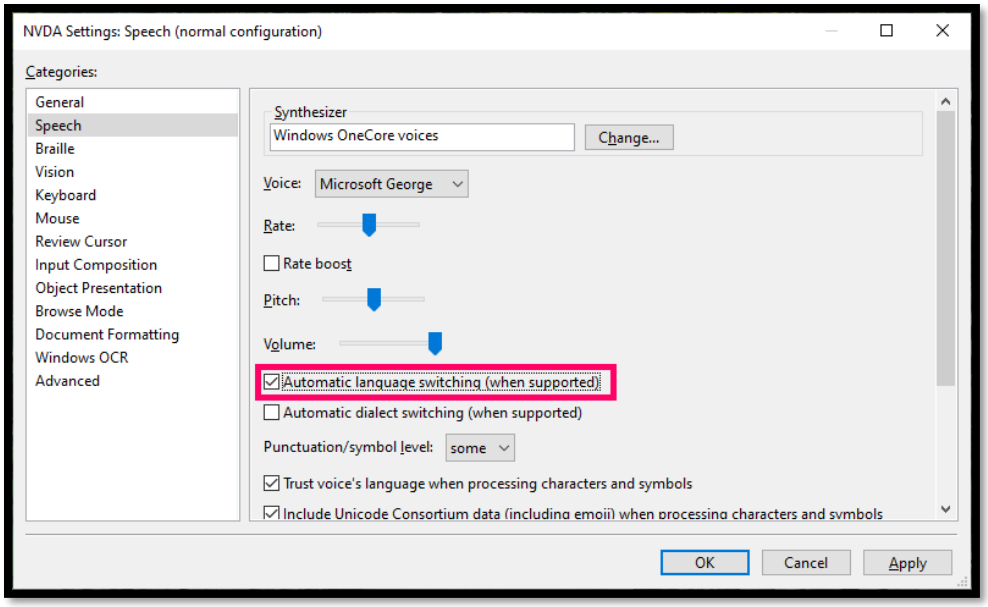

Figure 22 NVDA speech settings in the Preferences dialog.

The following graphic shows the highlight in a PDF document. I can't find a way to change the colour so I can see it. It is pale yellow!

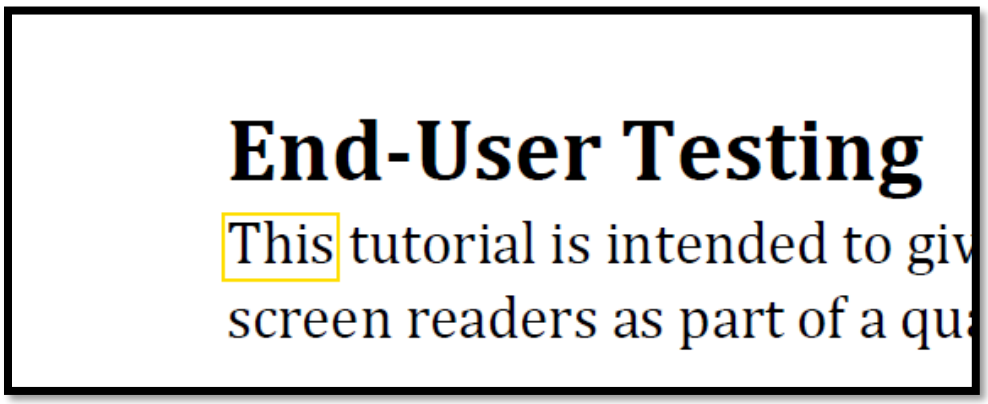

Figure 23 Pale yellow highlight of NVDA in a PDF.

You can purchase a version of the Eloquence speech synthesiser with NVDA. The voices available to you by default are voices that are on your operating system. They are natural phoneme voices and may not be able to read some symbols or characters.

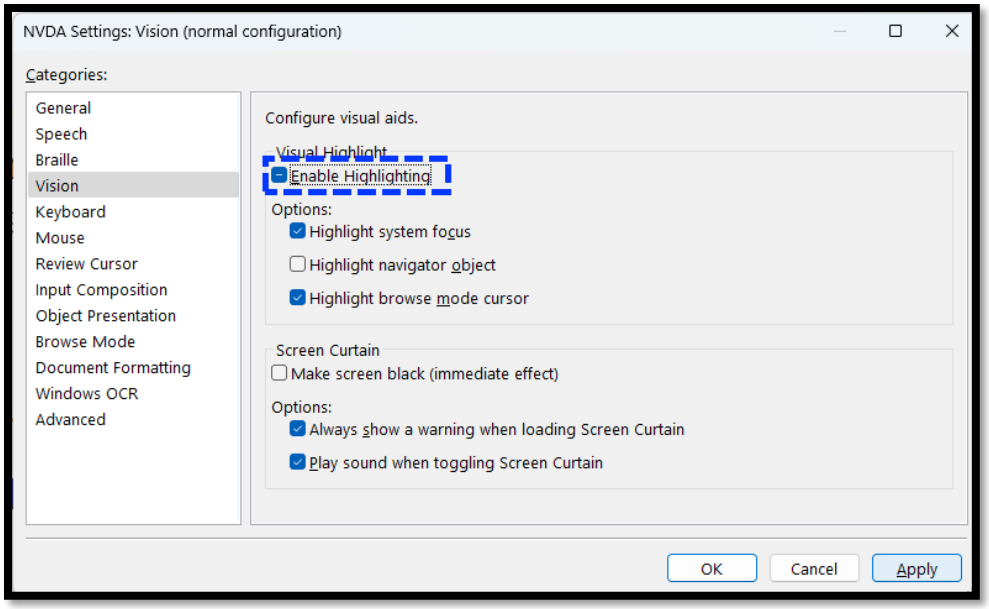

Figure 24 NVDA Vision settings showing the setting for highlight turned on in the Preferences dialog.

One setting you should turn on in the Vision category of settings is the ability to use the highlight. This feature is best used for PDFs with the “highlight navigator object” turned off, as shown in the preceding image. This changes the highlight in a PDF from the entire page to a focus point in the content.

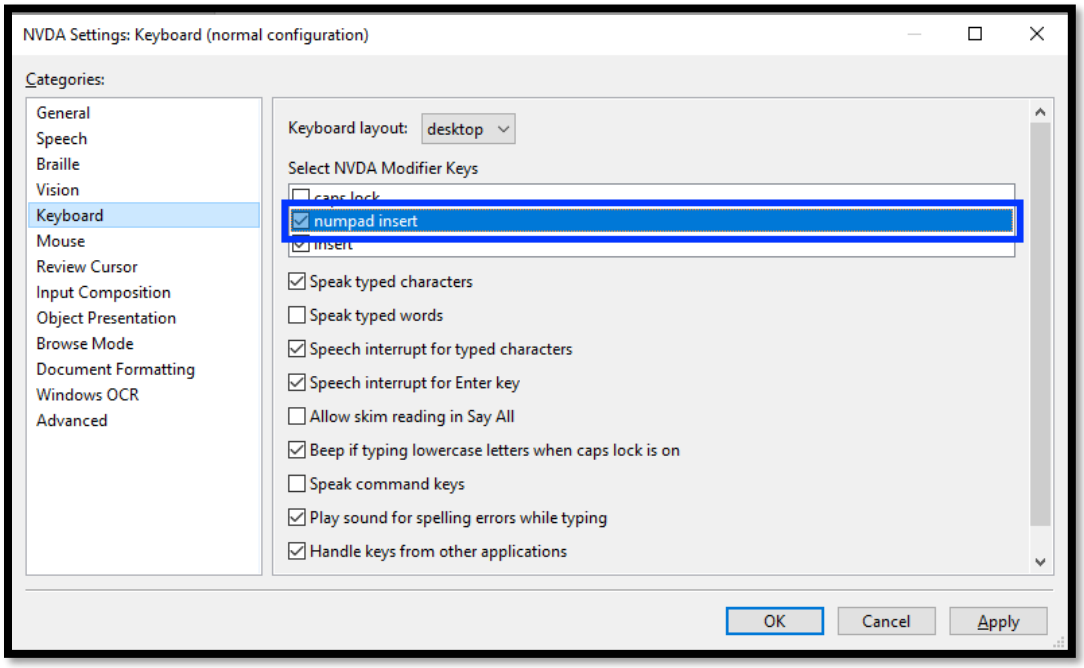

Figure 25 NVDA Keyboard setting for changing the NVDA key in the Preferences dialog.

The last setting to change if you use the JAWS screen reader and NVDA is to change the NVDA key to the Insert key instead of the Caps Lock key. This is done in the Keyboard settings category of the NVDA Preferences dialog. You need to check the check box for the Insert on the NumPad, not the Insert key on the "six-pack" between the main keyboard and the NumPad.

NVDA Basics

The following are some of the basic keyboard commands to control NVDA. Use them when performing the end-user testing part of the Quality Assurance process.

Stop speech	Ctrl
Pause Speech	Shift
Toggle Speech Mode	NVDA + S
Quit NVDA	NVDA + Q
Pass the next key through	NVDA + F2
Report current focus	NVDA + Tab
Report title	NVDA + T
Say all	NVDA + Down Arrow
Read current line	NVDA + Up Arrow
Read current text selection	NVDA + Shift +Up Arrow
Right mouse click	NumPad + Asterisk/Star

Text/Navigation Keyboard Commands (NVDA)

NVDA uses most of the same keyboard command conventions as JAWS does for reading and navigating text. These keyboard commands are used for most types of documents. They are standard keyboard commands.

Move to and read the previous character, Left Arrow

Move to and read the next character	Right Arrow
Read current character	NumPad 2 with the NumLock off
Move to and read the previous word	Ctrl + Left Arrow
Move to and read the next word	Ctrl + Right Arrow
Move to and read the previous line	Up Arrow
Move to and read the next line	Down Arrow
Read the current line	NumPad 8 with the NumLock off

Move to and read the previous paragraph	Ctrl + Up Arrow
Move to and read the next Paragraph	Ctrl + Down Arrow
Read the current paragraph	Ctrl + NumPad 5 with the NumLock off

Adjusting the NVDA Rate of Speech

To change the NVDA voice rate, press:

Decrease the voice rate	Ctrl + NVDA key + Down Arrow
Increase the voice rate	Ctrl + NVDA key + Up Arrow

NVDA Quick Keys

The following keyboard commands can be used in the virtual view of a document (PDF or HTML). These keyboard commands can be used in addition to the general navigation and reading commands. Once JAWS has reached the end of the document, it will start from the beginning again. NVDA uses the same keyboard commands but will stop and tell you there are no more elements once you reach the end of the document.

Move to Next Heading	H.
Move to Previous Heading	Shift + H
Move to Next List	L
Move to Previous List	Shift + L
Move to the Next List Item	letter I
Move to Previous List Item	Shift + letter I
Move to Next Table	T
Move to Previous Table	Shift + T
Move to the Next Link	K
Move to Previous Link	Shift + K
Move to Next Non-Link Text	N
Move to Previous Non-Link Text	Shift + N
Move to Next Unvisited Link	U
Move to Previous Unvisited Link	Shift + U
Move to Next Visited Link	V
Move to Previous Visited Link	Shift + V

Move to the next Graphic	G
Move to the previous Graphic	Shift + G
Move to the next Blockquote	Q
Move to the previous Blockquote	Shift + Q

NVDA, like JAWS, has the same access to information using only the NumPad.

Tables (NVDA)

NVDA uses the following keyboard commands to read and navigate tables.

It is essential to know that when using a screen reader, there are general text reading and navigation keyboard commands, table reading and navigation commands and keyboard commands for working with form controls.

Move to the previous column	Ctrl + Alt + Left Arrow
Move to the next column	Ctrl + Alt + Right Arrow
Move to the previous row	Ctrl + Alt +Up Arrow
Move to the next row	Ctrl + Alt + Down Arrow

Forms (NVDA)

The following keyboard commands are used when working with a PDF form that is accessible. I've added this caveat because if the form controls are made to be accessible, but the document author forgot to Tag the form, the form is not accessible.

Activate the current navigator object	NVDA + NumPad Enter
Enter Forms Mode	Enter or NVDA + Spacebar
Exit Forms Mode	NVDA + Spacebar
Move to the next Form Control	Tab
Move to the previous Form Control	Shift + Tab
Move to Next Form Control	F
Move to Previous Form Control	Shift + F
Move to Next Edit Field	E
Move to Previous Edit Field	Shift + E
Move to the next Button	B
Move to the next Check Box	X

Check or deselect Check Boxes	Spacebar
Move to the next Combo Box	C
Expand Combo Boxes	Alt + Down Arrow
Move to the next Radio Button	R
Select a choice in Radio Buttons	Left or Right Arrow

Strategy for testing PDF document accessibility

Some specific things can be tested using screen readers such as JAWS or NVDA. Among them is the existence of headings, the correct heading levels, matching the heading levels with the Bookmarks in the PDF document, navigating and reading lists, tables and graphics (Alt Text) and whether the ToolTips on your form controls have spelling mistakes.

Opening the PDF document

Always start the adaptive technology **BEFORE** you open the application and the document!

Adaptive technology depends on specific scripts for each application. The scripts must load first so that you have the best reading and navigation experience in digital content. If you start the adaptive technology, no matter what it is, you can experience inaccurate reading and navigation. This can easily be mistaken for inaccessible content.

Once you locate the PDF document you want to read, and it opens, listen carefully to the information you receive.

JAWS and NVDA will provide information as soon as the document loads unless you turn this ability off. This information includes how many Headings and Links there are in the document.

If you need to adjust the rate of speech, do so and then reopen the document so you can hear all the information provided.

Document Language and Language Changes

Some documents are bilingual. These documents still require the identification of a core language.

There are three aspects of language that might need testing in a PDF:

- The core language in Document Properties.
- The grouping Tag such as <Part> if it is used to identify a large part of the document in a different language.
- The language on a <Span> Tag if part of a sentence is in a different language.

> **Note:** You can't have different languages in Alt Text. There is currently no technique to identify a change in language in Alt Text. While you can add text in a different language in Alt text, it will be read using the default synthesiser language.

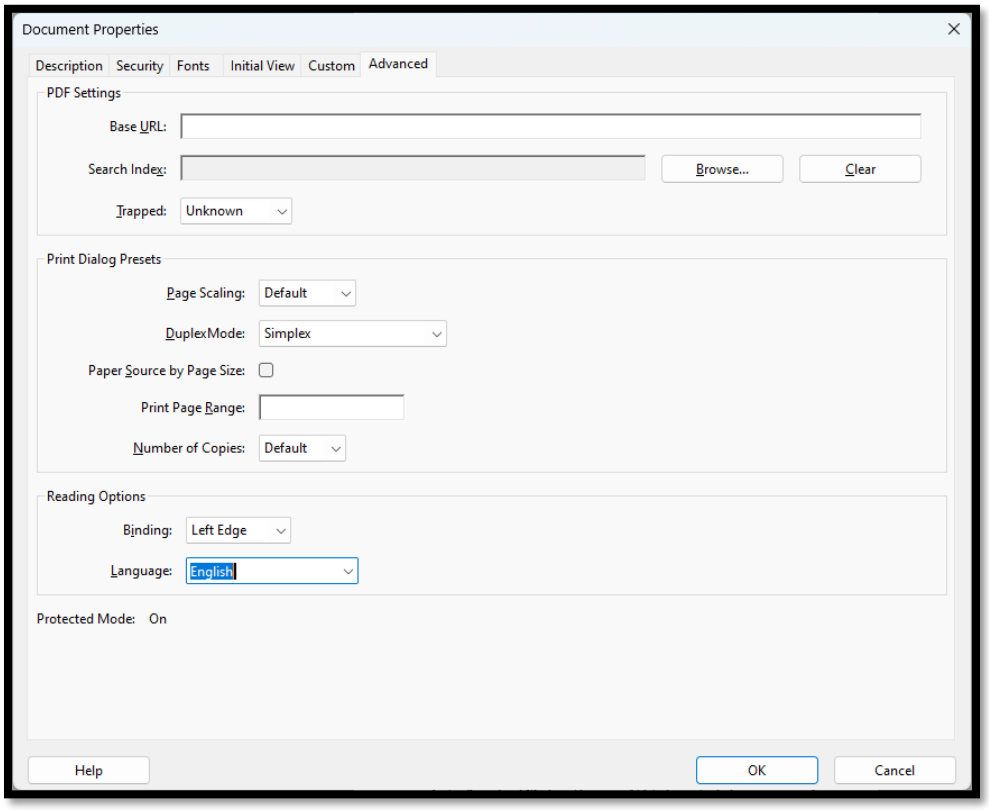

Figure 26 Document Properties of a PDF showing the core language setting.

The core language of a PDF can be determined by the document author or the operating system, or the application. For example, in Canada, we can have documents in both English

and French, with English down one side of the page and French down the other side of the page. Even in a bilingual country or region, one language must be chosen as the core language of the PDF. If this is not done, you will need to assign a language to every Tag or every grouping of Tags, and all automated accessibility checkers will flag the issue.

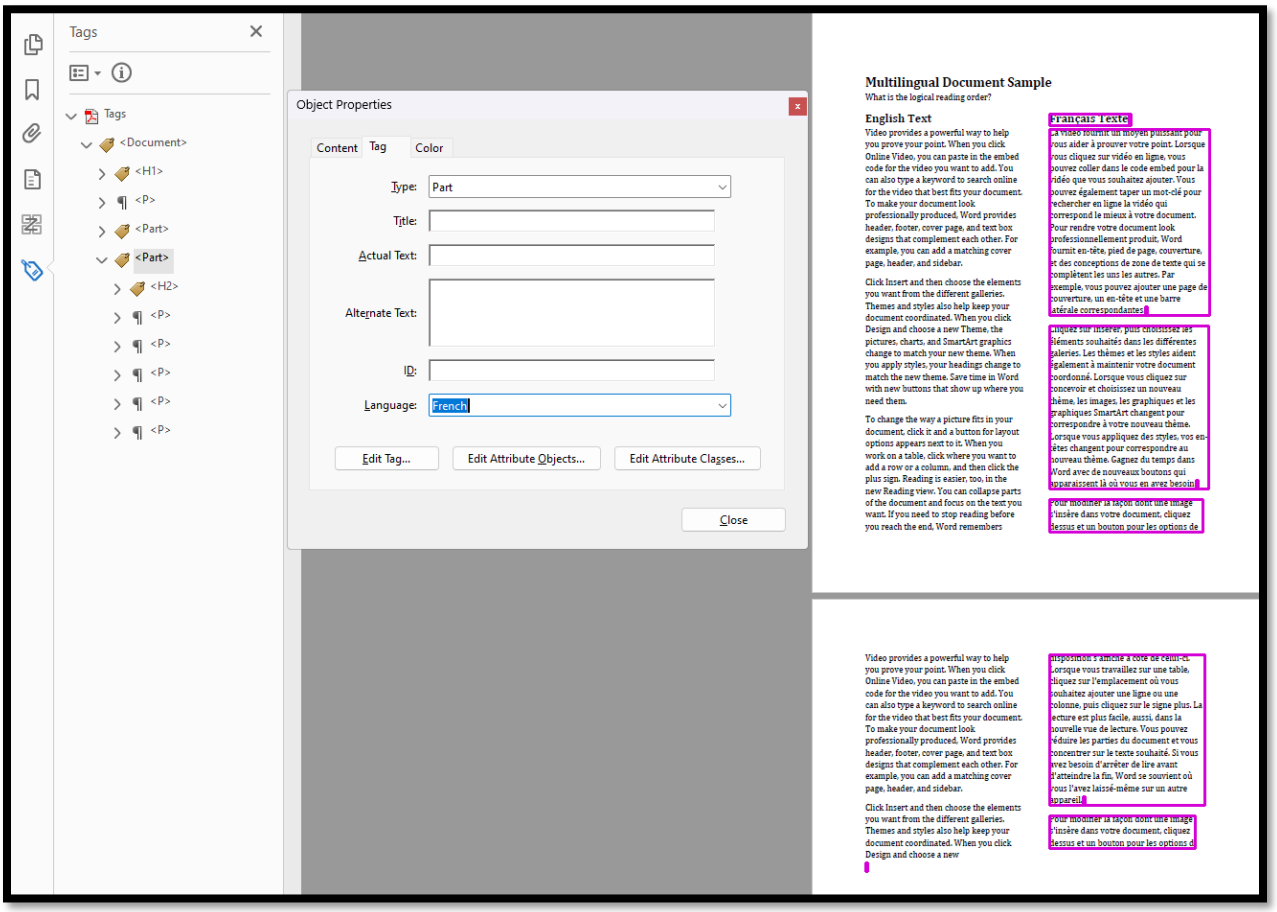

Figure 27 Bilingual PDF showing French text highlighted and Object Properties dialog open showing the French Language.

The remediation for this is to put all the English content under a <Part> Tag and all of the French content under a <Part> Tag. The language attribute goes on the <Part> Tag that starts the French. This avoids the necessity of changing the language for every piece of content in a different language.

A screen reader reads linearly. They cannot switch from one column to another so that the mirrored text is read after the first language. I know this is an issue raised by some who are bilingual and want to use a screen reader to compare text, but this is not how screen readers work. Imagine trying to read a document with the English down the left column and the French down the right if you continually are forced, by the Tags, to read one line in English and the corresponding line on the page in French.

If the document changes language within a sentence, the <Span> Tag isolates the text. The language change is applied to the <Span> Tag.

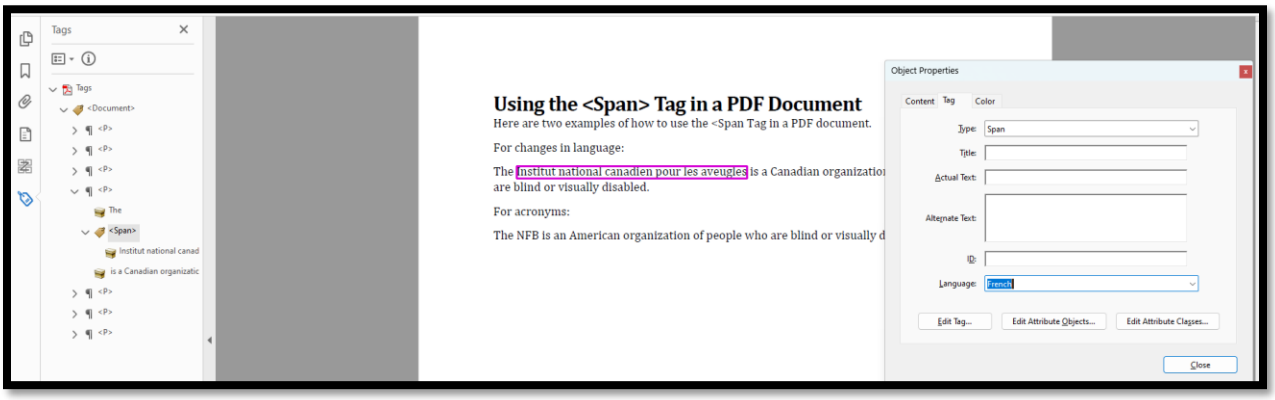

Figure 28 <Span> Tag used to identify the change in language for a sentence in PDF.

When an adaptive technology such as a screen reader comes across the sentence, the first part is read in the core language. The screen reader switches to a different language and reads the text, then returns to reading the text in the core language. Only the text under the <Span> Tag is read in a different language.

> **Note:** Consider some limitations when using a TTS tool for quality assurance. For example, Read&Write by TextHelp requires end-users to download additional languages and manually switch languages in the multilingual document. This seems counter-intuitive to accessibility as the person with a learning, cognitive or print disability must recognise the different language visually, stop reading, go to the settings and change the language for that piece of text, go back to settings, change the language back to the default and continue reading. This interrupts comprehension. However, it is a reality of some TTS tools.

Headings.

The JAWS keyboard command for viewing a list of headings in a PDF document is JawsKey + F6. Once the dialog opens, you can see the text for the heading followed by a number. The number is the heading level. Using the Up and Down Arrows, you can go through the list of Headings and hear whether the Headings are in sequential order.

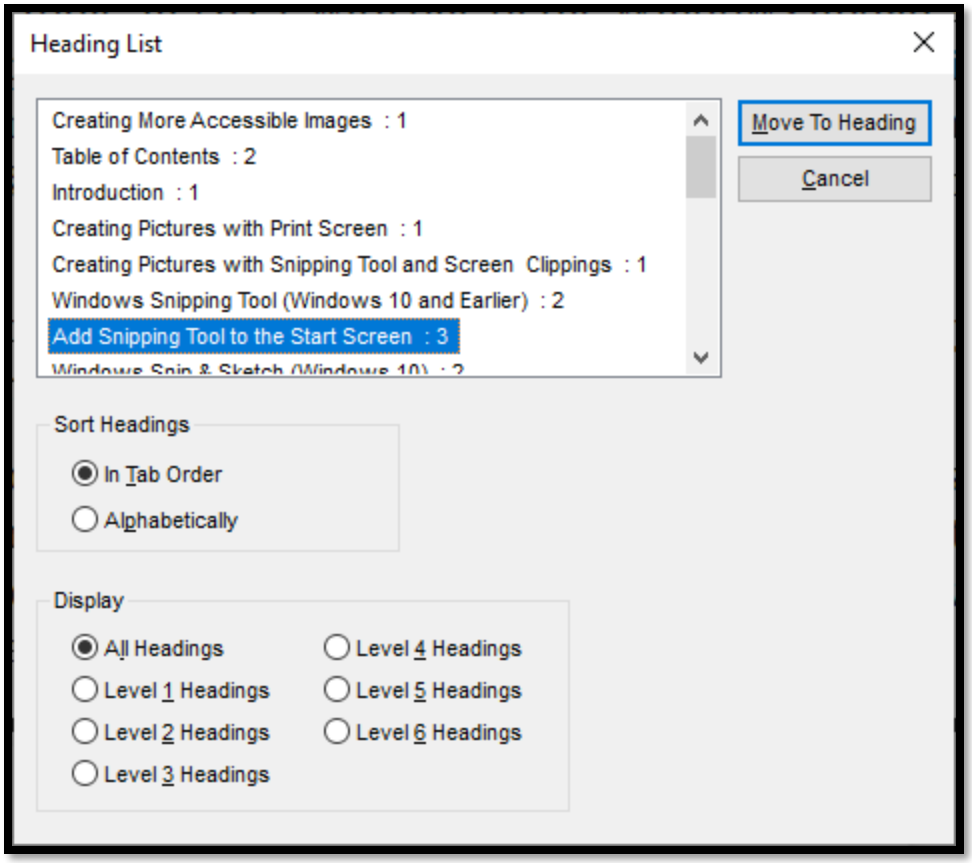

Figure 29 List of headings in a document from the JAWS screen reader.

If Headings are not in sequential order, H1 is followed by H3 instead of H2; you can press Escape to dismiss the list of Headings and make the necessary repair in the Tags Tree.

When the list of Headings is open, you can use first-character navigation to move to the previous and next Heading. For example, you could press the letter B to move to the first item in the list that starts with the letter B. By repeatedly pressing the same letter; you move through all items in the list that begin with that letter. Once you find the one you want, press Enter to move to that Heading in the document and start reading.

You can use the Navigation Quick Keys to move through Headings in a PDF document without getting a list of headings. These keyboard commands are the same for JAWS and NVDA.

- Press H to move to and read the Next Heading and the Heading level.
- Press Shift + H to move to and read the Previous Heading and the Heading level.
- Press any number, 1 through 6, to move to the next Heading at that level in the document. Pressing Shift + a number from 1 through 6 moves you to the previous Heading at that level in the document.

NVDA has one keyboard command that lets you toggle between viewing Headings and Links in a dialog. The default is to view a list of Links. Once the dialog opens, press Shift + Tab to move to the radio buttons for Links or Headings. Use the Right Arrow to choose Headings and then press Tab to move into the list of Headings. Repeat the process for Links if Headings is the default.

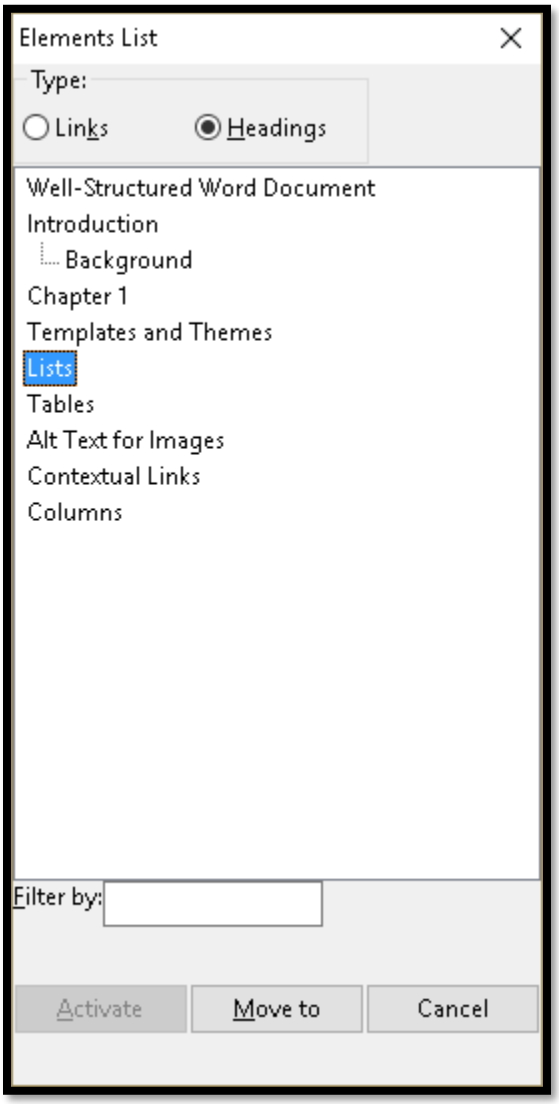

Figure 30 NVDA Elements List dialog showing Headings in the document.

Appendices B and C provide other keyboard commands for moving through specific levels of headings in a PDF document. They are not necessary for quality assurance/compliance testing but have been included for interest.

Graphics (Alt Text)

When adaptive technology such as a screen reader or TTS tools encounter an image, information about that image is provided to the end-user. If an image is an Artifact, the

adaptive technology (screen readers and Text-to-Speech tools) don't see it. Artifacts are part of the page background and are primarily decorative. They do not support the content in any meaningful way.

Using either the JAWS or NVDA screen reader, you can go through the document image by image by pressing G and Shift + G to move to the Next and Previous Graphic. JAWS will move to that graphic and read the Alt Text.

You can get a list of graphics in a PDF document using JAWS. This capability was broken in JAWS 17 and 18. Keeping up with bugs in screen readers and TTS tools helps you test documents more effectively. The "solution" isn't to create a workaround in the PDF document to compensate for one version or build of adaptive technology. The "solution" is to go back to the Tags Tree and ensure that everything is as it should be. When in doubt, go back to the Tags Tree. We do NOT make content accessible to specific versions of adaptive technology. In doing so, we may inadvertently create accessibility barriers for other versions of the adaptive technology.

Press JawsKey + F3, then G for Graphics. This gives you a list of graphics in a PDF document by their Alt Text.

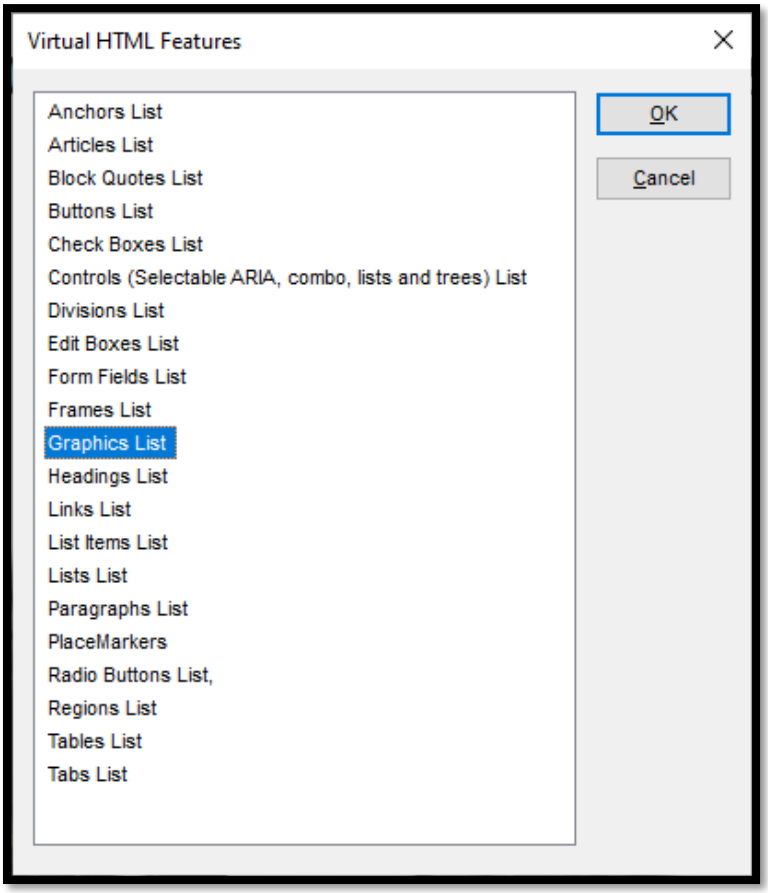

Figure 31 Virtual HTML Features dialog.

The dialog is titled “Virtual HTML Features” because we are always in a virtual view of the PDF document. The dialog has not been renamed to reflect the different format environments.

In a list of images by their Alt Text, JAWS will read the Alt Text, and it will be easy to spot any spelling mistakes in the Alt Text and then make the necessary repairs. This is a valuable tool for quickly checking images’ Alt text and ensuring that any image that requires Alt Text has it.

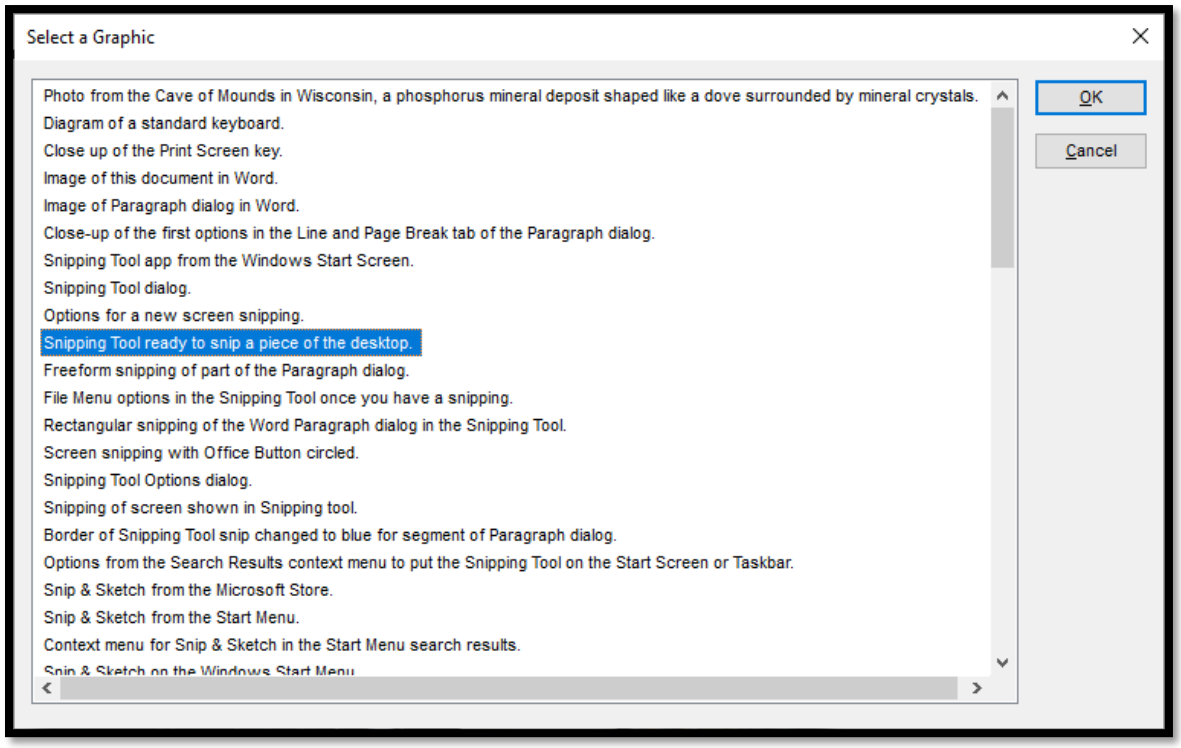

Figure 32 List of Graphics by their Alt Text in a PDF document using JAWS.

The best way to remediate Alt Text with a typo is to move to that graphic using the List of Graphics. The list will disappear once you choose a graphic to go to.

Use the Select Tool in Acrobat to select text before the document’s graphic.

Click on the Options button in the Tags Tree and choose to Find Tag from Selection.

The Tag in the Tags Tree will expand. You might have to scroll down to that point in the Tags Tree if you are working with a long document.

Once the Tag is located, press the AppKey or right mouse button to open the Object Properties context menu.

Choose Properties.

Edit the Alt Text for the graphic/image and then click Close.

Once you've corrected the Alt Text for an image, save the document.

You might have to close and reopen the document for the JAWS or NVDA buffer to refresh.

If you are using JAWS, get another list of Graphics and check the Alt Text that was wrong.

If you are using NVDA, press G to move to that graphic and listen to the Alt text to confirm that it is corrected.

Once you land on a graphic, reviewing the text just before and after it is helpful to verify the logical reading order. This will verify that the graphic is located within the content/Tags Tree where it should be and is not floating off somewhere apart from its associated content. This technique saves time because you spend less time reading the entire document.

Lists

The JAWS and NVDA screen readers have keyboard commands for reviewing lists in PDF documents.

Pressing L and Shift + L will take you to the Next and Previous List.

If you want to move through the list items, the bulleted or numbered list items themselves, press letter I or Shift + letter I while using either JAWS or NVDA to move to the Next or Previous List Item.

You can also use Ctrl + Up or Down Arrow to move to and read the next or previous List Item.

As with Graphics, you can get a list of Lists in a PDF document using the JAWS screen reader. Bullets, numbers, and sub-list indicators such as a are included so you can determine if sub-lists are present.

If you get a list of Lists, what is listed is the first item in each list. Since lists have related content, it is easy to move to a specific list and begin reading it.

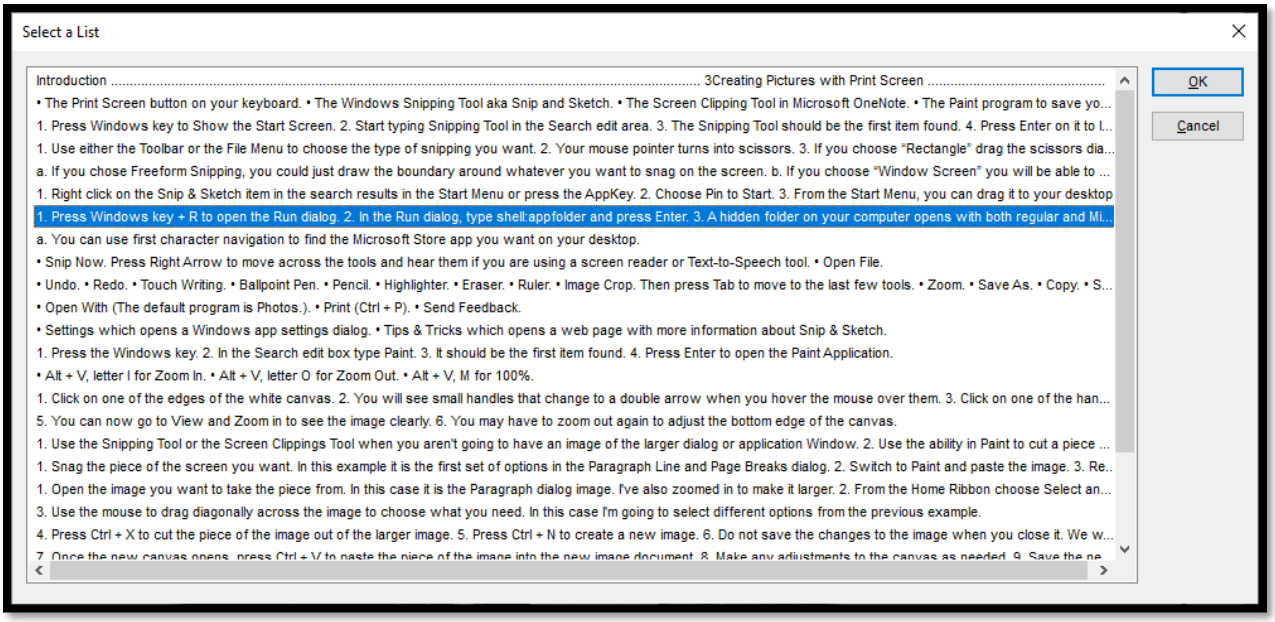

Figure 33 List of Lists in a PDF document using the JAWS screen reader.

You can get a list of list items in a PDF document by pressing JawsKey + F3 and then choosing List Items from the list.

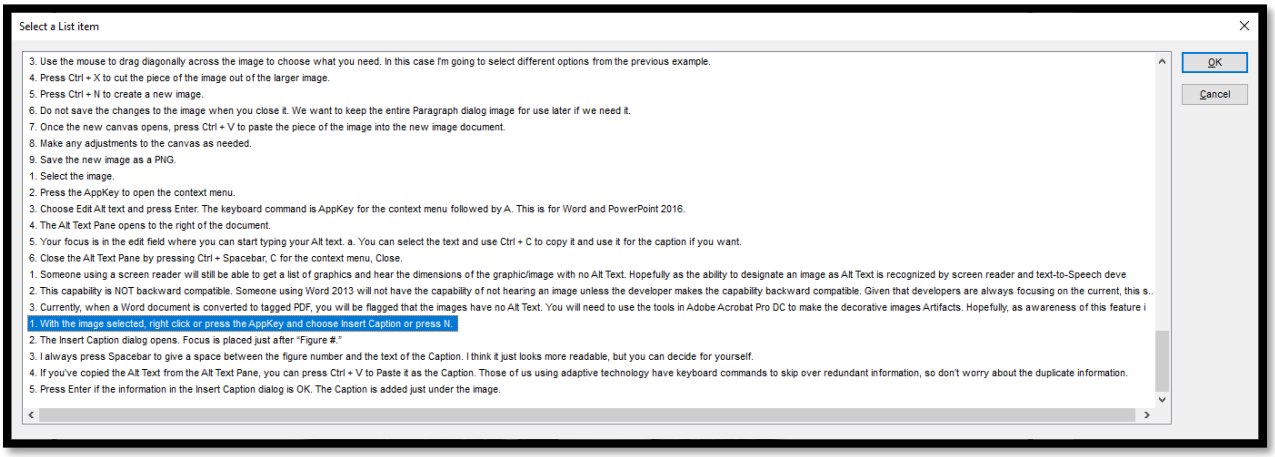

Figure 34 List of List Items using the JAWS screen reader in a PDF document.

Each bulleted or numbered list item is displayed with a bullet or number. This is an easy way to skim through instruction steps without going to the place in the document if you are a screen reader user.

Links

It is a misconception that those of us who use screen readers Tab through all types of content. We use Tab and Shift + Tab to move to the next and previous link, respectively. The next or previous form control has separate keyboard commands for navigating and reading the text layer of content and additional keyboard commands for reading and navigating data tables.

The JAWS screen reader provides multiple methods of moving through and activating Links in a PDF document.

The most popular method is JawsKey + F7 to get a list of Links.

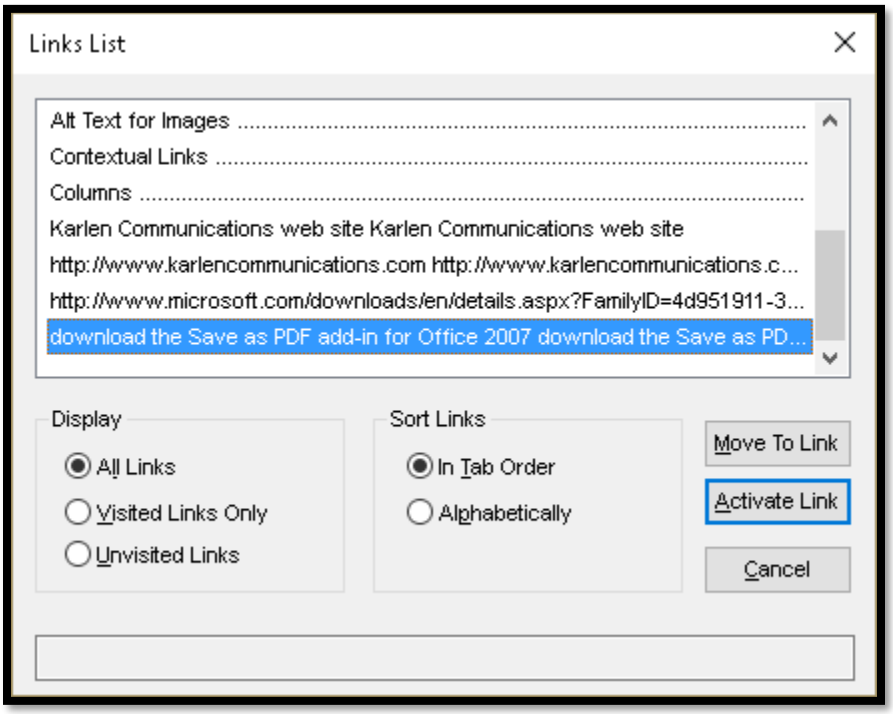

Figure 35 List of Links from the JAWS screen reader.

In the preceding image, there are long web addresses in the document. These are from Footnotes I've added in addition to the contextual Links to maximise the accessibility of the document. If I wanted, I could go to the <Link> Tag and add Alt text for each link. This will be flagged in a PDF/UA accessibility check until I add the Alt text. However, when someone is reading the PDF document, they will hear the Alt Text but be able to use keyboard commands to read through the lengthy web address.

JAWS and NVDA have Quick Keys to move to visited and unvisited Links:

- Press U or Shift + U to move to the next or previous unvisited Link.
- Press V or Shift + V to move to the next or previously visited Link

- Press Tab or Shift + Tab to move to the next or previous Link, whether it has been visited.

If the end-user has visited a link within a document and wants to go back to it, pressing V and Shift + V to move to the Next and Previous Visited Link will do this nicely.

The third method of seeing a List of Links is to press JawsKey + F3, choose Listed Links, and then press Enter. This gives you a list of links that is the same as pressing JawsKey + F7. It is simply another way to get there.

Once you go to a link, you will need to activate it by pressing the Enter key while the focus is on it. You might be asked if you trust the destination the link is taking you to. There are usually two buttons for this: Allow and Cancel.

Sometimes Links will show you the pointing finger and even appear in a list of Links or by navigating to a Link, but once the Enter key is pressed to activate the Link, nothing happens. This Link would need to be remediated so it can be activated using the keyboard.

Going through all links in a PDF document and ensuring they can be activated using the keyboard can be accomplished more easily using these keyboard commands. You don't have to search for links; you move from link to link.

There are some instances where a link may appear accessible but can only be activated using the mouse. Verifying keyboard access to linked information should be part of Quality Assurance protocols.

Tables

Table reading and navigation keyboard commands differ from the normal reading and navigation keyboard commands for both screen readers.

This is one reason that putting content in a table for design layout in any application causes barriers to accessing that information.

The screen reader thinks it is in a table (which it is), but suddenly, you want it to ignore the table structure and read lists, headings and other "normal" types of document elements that should be outside of a table structure.

When testing table reading and navigation in PDF documents, you should beware that if you just read through the document using a SayAll command, you will not have access to the more granular elements of a table.

A screen reader will tell you that you are in a table, but you have told it to just read without stopping it to go into the table reading and navigation commands.

Even if you stop reading, if you then use the Up or Down Arrow, the contents of a row will be read as if they were a line. Again, this is because you are not using the table reading and navigation keyboard commands.

If you use Ctrl + Up or Down Arrow, the rows will be read as paragraphs because you have not used the table reading and navigation keyboard commands.

The only way to review a table is to use the table reading and navigation commands for the adaptive technology you are using.

One caveat to using the keyboard commands for tables when examining large tables is that sometimes the adaptive technology gets tired. You may start reading a table and get the column, then row titles followed by the data, and suddenly get the row titles followed by the column titles followed by the data. This is normal. Those who use adaptive technology get used to the quirks and limitations of technology.

JAWS lets you get a list of tables using the JawsKey + F3 keyboard command. As with other elements, choose Tables from the list.

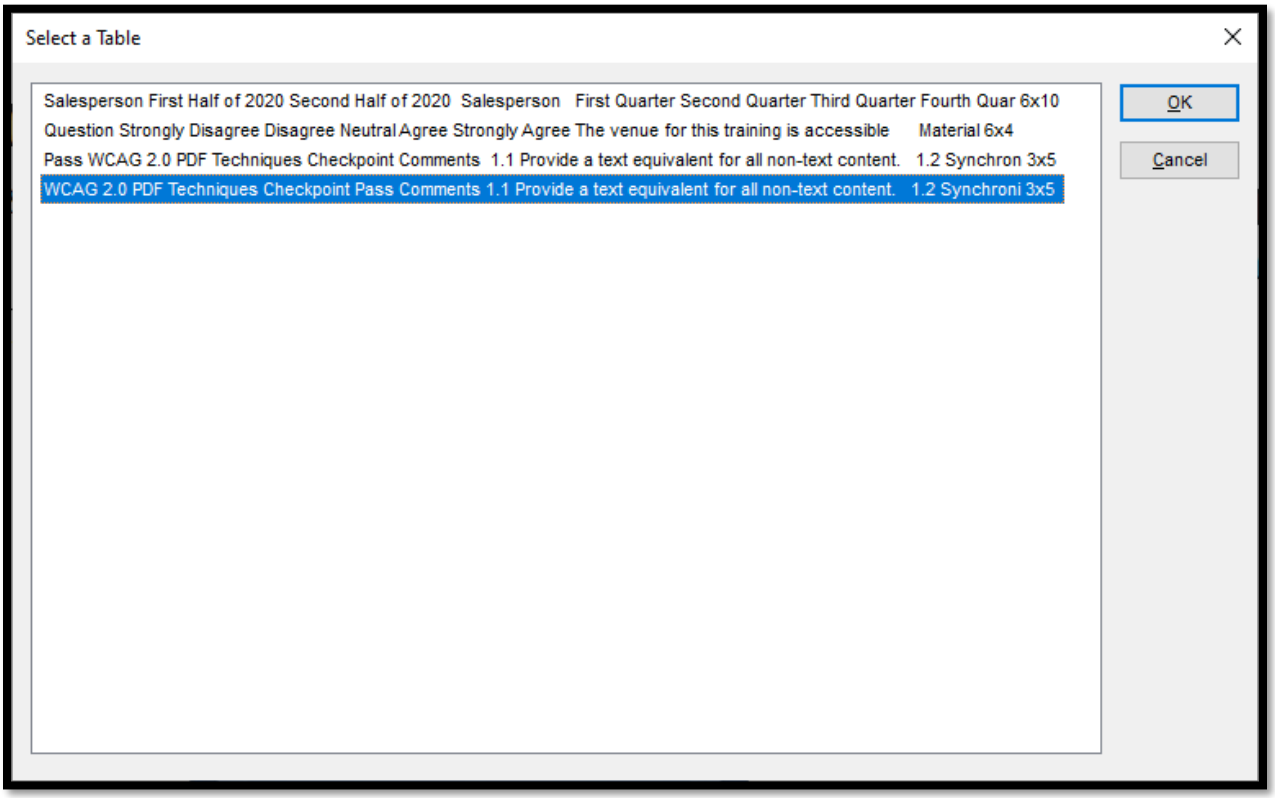

Figure 36 List of tables in a document using the JAWS screen reader.

The first row of a table is identified. Pressing Enter on the “table” takes you directly to that table, where you can begin reading or reviewing the table content.

The Jaws Table reading and navigation commands are:

List Tables	Ctrl + JawsKey + T
Move to Next Table	T
Move to Previous Table	Shift + T
Select Table	F8
Jump to Table Cell (from within a table)	Ctrl + Windows Key + J
Return to Previous Cell	Ctrl + Shift + Windows Key + J
Read Current Cell	Ctrl + Alt + NumPad 5
Move to and Read the Next Cell	Ctrl + Alt + Right Arrow
Move to and Read Prior Cell	Ctrl + Alt + Left Arrow
Move to and Read Cell above	Ctrl + Alt + Up Arrow
Move to and Read Cell below	Ctrl + Alt + Down Arrow
Move to and Read First Cell	Ctrl + Alt + Home
Move to and Read the Last Cell	Ctrl + Alt + End
Read Next Row	Windows Key + Alt + Down Arrow
Read Previous Row	Windows Key + Alt + Up Arrow
Read Current Row	Alt + Windows Key + Comma
Read from Beginning of Row to Current Cell	JawsKey + Shift + Home
Read from Current Cell to End of Row	JawsKey + Shift + Page Up
Read Current Column	Alt + Windows Key + Period
Read from the Top of the Column to the Current Cell	JawsKey + Shift + End
Read from Current Cell to Bottom of Column	JawsKey + Shift + Page Down
Read Next Column	Windows Key + Alt + Right Arrow
Read Previous Column	Windows Key + Alt + Left Arrow

The NVDA table reading and navigation commands are:

It is essential to know that when using a screen reader, there are general text reading and navigation keyboard commands, table reading and navigation commands and keyboard commands for working with form controls.

Move to the previous column	Ctrl + Alt + Left Arrow

Move to the next column	Ctrl + Alt + Right Arrow
Move to the previous row	Ctrl + Alt +Up Arrow
Move to the next row	Ctrl + Alt + Down Arrow

> **Note:** If you are reading a complex table or a long multi-page table, you may notice that the screen readers will start reversing information. For example, they may have been reading column title, row title and cell contents followed by cell coordinates and suddenly start reading cell coordinates, row title, cell contents and column title. This is normal and represents that adaptive technology, like you, can get tired of reading the same thing for a long time. The important thing is whether all of the information is being read. If you want to try and retain the original table reading order, close the document, open it again and return to the table, you were examining. Everyone needs a break now and then!

Forms

When testing a PDF form for accessibility, there are a few different things that need to be tested:

- The instructional text is tested using standard reading/navigation keyboard commands.
- The form controls themselves, which can be tested using Tab or Shift + Tab and any form-specific keyboard commands for adaptive technology.
- Any part of the form contained within a table structure using the table reading/navigation keyboard commands for adaptive technology.

A form is NOT accessible if every part of the form, text and form controls is in a form control! I've seen this method force those who use screen readers to read EVERYTHING in the form. Since we don't think of forcing those not using screen readers to read everything on a page, why are we so preoccupied with forcing those of us using adaptive technology to read everything on a page/form? This is a form of ableism. It also creates an accessibility barrier.

When testing a form for accessibility, those doing the testing must know and understand the specific keyboard commands for the type of structural elements they will encounter in a form.

There may be Headings to divide areas of the form, such as Contact Information, Employment Record, Academic Record, Course Selection and so forth.

There may be links in a form that lead to additional instructional text, information about the organisation that created the form or privacy information.

Any table that is used for the design layout of the radio button series must have the appropriate <Table>, <TR>, <TH> and <TD> Tags. The instructional text should not be contained within a table structure.

Using a screen reader is an excellent way to review the ToolTips to ensure that there are no misspelt words.

Table 1 The following is a quick reference guide for screen readers working with forms.

Description	JAWS	NVDA
Enter forms mode	Enter	Enter or NVDA Spacebar
Exit forms mode	Escape or Tab to next form control	NVDA + Spacebar
Next form control	F or Tab	F or Tab
Previous form control	Shift + F or Shift + Tab	Shift _ F or Shift + Tab
Next Check Box	X	X
Previous Check Box	X	X
Check a Check Box	Spacebar	Spacebar
Next Radio Button	A	R
Previous Radio Button	Shift + A	Shift + R
Select a Radio Button	Spacebar	Left or Right Arrow
Next Combo List	C	C
Previous Combo List	Shift + C	Shift + C
Expand Combo List	Alt + Down Arrow	Alt + Down Arrow
Move to the next Edit Field.	E	E
Move to the previous Edit Field.	Shift E	Shift + E
Move to the next Button.	B	B
Move to the previous Button.	Shift + B	Shift + B
Activate Submit or another button	Spacebar	NVDA + Enter

Summary

As I finished this document, I converted a Word document in which the language was English, and the conversion language in the Adobe Acrobat Pro Properties dialog was English. However, JAWS 2023, installed on my desktop computer three days ago, read the title using a synthesised French voice. NVDA did not do this. Don't rely on a single report of a barrier as being the most accurate.

I checked the Tag properties as well. I added English to the Tag properties, saved the document, closed Acrobat, restarted my computer for good measure, and returned to the

same document. The first two lines, the document's title, was still causing JAWS 2023 to switch to a French synthesiser.

This document wasn't a revision. I had this issue with one of the captions in the document. I selected the entire Word document and reassigned the proofing language. The whole document read as it should with JAWS if I was in Word. Once converted to a tagged PDF, the document's title consistently reads using the French synthesiser even though the text is English.

User testing with adaptive technology requires:

1. A defined protocol that everyone adheres to.
2. A group of end-users with the same computer literacy level.
3. Keeping the adaptive technology settings as basic or out of the box as possible.
4. An understanding of an accessibility barrier in the document versus a broken capability in the adaptive technology.
5. Starting the adaptive technology BEFORE launching the application/document!
6. Avoid using the mouse and just listening for "babble".