*To be part of the following document: https://w3c.github.io/epub-specs/epub33/fxl-a11y/*

# Fixed layout accessibility guidance for reading systems

An EPUB reading system can take many forms. It might have a small or big visual display area for visually rendering the content to users, or it might only provide audio playback or tactile display. It can be dedicated to the EPUB format or handle many formats. It can depend on an operating system ecosystem including assistive technologies or be self-sufficient on a dedicated reading device. Therefore, there is no single set of rules that applies to all reading systems, this section presents the most important aspects of reading a fixed-layout publication to take into consideration.

This section is composed of three parts:

- a general statement about information to provide on supported level of accessibility in fixed layout;
- a description of minimal requisites for accessibility of fixed layout;
- a description of extended possibilities to propose alternate renderings of the content to fit most users' needs.

## Informing about the support of fixed layout

As fixed-layout files are not supported by all reading systems but may be displayed without taking into consideration the particularities of this format, the information about the scope supported should be given to the user. This precaution is important to avoid deception of the user and misunderstandings about the format and its capabilities. A person facing a bad reading experience will complain about the publisher or the format before accounting that it's a reading system limitation.

This information can be simplified as follows:

Examples

- Full support of fixed layout, including accessibility features
- Full support of fixed layout without accessibility features
- No particular support of fixed layout, reading experience may be noisy
- Not supporting fixed layouts files, fallbacks will be used if they are provided.

## Reading system accessibility requisites

Any Reading System must take into consideration the elements listed in the Accessibility section of the EPUB Reading Systems 3.3 W3C Recommendation.

Taking into consideration that Fixed layouts are composed of a large variety of EPUB features, often using an extended set in comparison to reflowable epubs, to make sure that minimum support exists, some strong points and additions to this list are to be observed. Those will be detailed in the following subsections. They are:

1. display the accessibility metadata provided in an EPUB;
2. enable use of assistive technologies;
3. support EPUB navigation;
4. enable resizing a page up to 200 per cent.;
5. enable the display of an image full screen;
6. enable access to alternative text and extended descriptions;
7. support EPUB Media Overlays;
8. support non-breaking accessibility protection methods

## Display the accessibility metadata

A reading system should provide rendered information on accessibility metadata provided by the OPF. Guidance for key information and proposed wordings are provided by the W3C publishing group accessibility task force Community Group Report: User Experience Guide for Displaying Accessibility Metadata 2.0.

## Enable use of assistive technologies

Assistive technologies are user agents helping users with specific needs to get access and interact with the content. They are often used in combination with a reading system and an operating system, therefore particular attention must be provided to make sure no blocking happens.

This support happens through API Integration, ensuring that the accessibility tree, including support for roles, states and properties provided by Accessible Rich Internet Applications (WAI-ARIA) 1.1 and Digital Publishing WAI-ARIA Module 1.1, is exposed to the underlying operating system's accessibility API so that users can fully interact with the content when using assistive technologies.

User Agent Accessibility Guidelines (UAAG) are the reference resources to guarantee full access to assistive technologies within a reading system. They are provided by the W3C Web Accessibility Initiative (WAI).

## Support EPUB navigation

Navigation within a file provides the reader with the ability to reach portions and points of a document it is important for every user and becomes crucial when one cannot depend on visual styling to figure out what are the divisions of a document like pages, sections or headings.

The EPUB Reading Systems 3.3 recommendation comportes a dedicated section about Navigation document processing. Regarding fixed layout files, pagination is often the main reference, therefore supporting page lists should not be avoided. Authored tables of content

and landmarks are also important as they represent navigation options the publishers consider meaningful.

## Enable resizing a page

As the canonical reference of a fixed layout is often the representation of a printed page with constraints on viewport and display, a reading system providing accessibility to a fixed layout must enable zooming of a page. This must be possible without assistive technology and guarantee that no content or functionality is lost.

Resizing a page should not affect the original proportions, acting like a magnificent glass and should allow at least 200 per cent of the original size.

## Enable the display of an image full-screen

Fixed Layout pages are generally composed of one or more images, therefore it should be possible to view each of them fullscreen.

## Enable access to alternative text and extended descriptions

Alternative texts are usually hidden from visual reading and exposed to assistive technologies and non-visual reading methods like TTS. The addition of visual display for those contents should be considered carefully as, in complex layouts including imbricated images, it may lead to overlay masking content.

Extended descriptions including long and structured content that cannot be authored as alt argument are usually provided as links to annexes or included into foldable elements like Details. Even if they are not often present in fixed layouts due to the complexity of authoring them, reading systems must make sure that interactions are available.

## Support EPUB Media Overlay.

Often used in educational or children's literature context, Fixed layout EPUB are works that contain synchronized audio narration defined in the https://www.w3.org/TR/epub-33/#sec-media-overlays. Supporting this feature is highly recommended for reading systems

Recommendations for Media overlay support are provided in the EPUB Reading Systems 3.3  Media overlay processing section.

## Support non-breaking content protection methods

Despite all efforts provided to ensure that a reading system offers rich accessibility features for a fixed layout, a file may become non-accessible due to content protection restrictions

blocking accessibility APIs access. Reading system developers must ensure that the protection method accepted preserves all the accessibility features described in this document.

If this is not the case, users must be informed of the limitations implied by the protection method used to protect the file.

## Alternative renderings

While fixed layout files represent a strong authoring effort to display elements in a visual order, not all reading systems support visual display and many offer limited screen sizes. Therefore, many reading systems might be obliged to provide a bad reading experience or renounce to support fixed layout files.
It must also be considered that a large number of users are facing difficulties in consuming content and orientating themself in complex fixed-layout designs. Therefore alternative rendering should be considered as a replacement or addition to the fixed layout rendering.

> Warning

Providing an alternative rendering of publications that do not conform to a minimum WCAG A level may result in an unreadable or bad reading experience. The resulting spoken text may be in a disordered reading order, with broken sentences and choppy pronunciation. Therefore the user must be informed if the metadata conforms to WCAG is absent. More metadata combinations can help presume that the spoken content will not alternate comprehension. The two main values to lookup are `readingOrder` and `ttsMarkup`.

### TTS rendering of the content

Not all reading systems work on an operating system providing assistive technology and not all readers with specific needs related to reading impairments are comfortable with using complex assistive technologies. Therefore a Text-to-speech (TTS) functionality is a strong requirement for a reading system claiming to provide fixed layout accessibility support.

**Accessible Name and Description Computation**: this draft specification is a useful normative reference to implement a Text-To-Speech read-aloud experience, i.e. to build a playback stream of utterances based on the authored document structured text and semantics, and given the user's preferences such as skippability and verbosity options (e.g. page breaks, image alt text, image extended descriptions, sidenotes, endnotes, footnotes, Japanese Ruby annotations, etc.).
https://www.w3.org/TR/accname-1.2/#mapping_additional_nd_te
https://github.com/w3c/accname
*( NOTE TO EXCLUDE FROM THIS DOCUMENT: Thorium's specific discussion https://github.com/readium/r2-navigator-js/issues/76 )*

A variety of TTS APIs and speech engines are available. An example is the Web Speech API from W3C Web Platform Incubator Community Group. Reading system developers can test their support of TTS with Epubtest.org Fundamental Accessibility Tests Read Aloud.

The W3C recommendation EPUB 3 Text-to-Speech Enhancements 1.0 reading system support section provides additional information on experimental TTS features support.

## Display transform options

The best way to provide the user with the ability to modify the display of textual content (e.g., to change the font family, font size, line height and word spacing) is to extract and display the content as text. It comes down to exposing the content sent to the speech synthesis through TTS.

All styling options provided in the authored content should be ignored as positionings and absolute length units (e.g., pixels and points) may lead to superimposed content.

## Adding Semantics to alternative renderings

In visual reading, many semantic elements are identified by their style (e.g. citations in italics). When the content is consumed without visual support (TTS) or with all styles ignored, this information is lost. HTML semantics and ARIA roles are used by assistive technologies to add rich information to their users. Such behaviours should be considered but caution must be taken as it may lead to unwanted verbosity and breaks in reading experience as well as repetitions of content readen.

To implement semantics additions, reading system developers must follow the W3C recommendation on Accessible Name and Description Computation. Adding semantics from Digital Publishing WAI-ARIA Module should be considered as it is dedicated to the ebook world.

At least one method must be proposed to allow the user to switch on or off this feature. In addition, different levels of verbosity may be proposed to allow the user to fine-tune his reading experience.

## Fallbacks

Few publications offer fallback options for XHTML elements. Most often they are used to ensure that older reading systems will not try to read the content. Therefore, at the actual state, reading systems should not try to read fallbacks unless they can’t read XHTML.