PDF association

Representing PDF semantics to accessibility APIs

Duff Johnson



Duff Johnson, PDF Association CEO



- 25 years working with Tagged PDF
- Led PDF/UA development since 2004
  - Chaired AIIM's PDF/UA Working Group 2004-2012, developing ISO 14289-1:2014 (PDF/UA-1) for PDF 1.7 (*first published 2012*)
  - ISO Project Leader, ISO 14289-2:2024 (PDF/UA-2) for PDF 2.0
- ISO 32000 Project Leader, 2011-2021
- Contributor to the PDF Association's accessibility-related WGs
- Instigated the PDF Association's Techniques for Accessible PDF project
- Instigated the **PDF Accessibility API Mappings (PDF-AAM)** collaboration between ARIA WG and the PDF Association's PDF/UA Processor LWG.

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The Portable Document Format



- Published by Adobe from 1993 to 2006
  - PDF 1.0 to PDF 1.7, free specification, royalty-free use
- PDF enables digital transformation
  - Reliable, device-independent, color- and pixel-accurate rendering
  - Self-contained, supports offline use
  - Supports key business requirements (e.g., arbitrary layouts / page size, archival, graphic arts, engineering, security, digital signatures, redaction, etc.)
  - Continuously evolving (e.g. updated hash algorithms, digital signatures, encryption, Brotli compression, etc.)
- Adobe relinquished PDF to ISO in January 2007
  - PDF 1.7 fast-tracked as ISO 32000-1:2008
  - PDF 2.0 first published as ISO 32000-2:2017, updated in 2020
  - PDF 2.0 was the first vendor-neutral, consensus-based PDF specification
- PDF is now managed by the PDF Association
- **Today, browsers dominate PDF viewing, so alignment is crucial.**

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Semantics in PDF = “Tagged PDF”

- First specified in PDF 1.4 (2001)
  - Logical structure tree defines the content’s reading order
  - Structure elements based on marked content sequences
  - Later PDF versions added enriched semantics
- PDF 2.0 (2017) added:
  - Improved specification
  - New structure element types
  - Support for ARIA attributes
  - Support for namespaces
  - Support for MathML structure elements



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The PDF Association

- Created to promote awareness and understanding of ISO 19005 (PDF/A) on a vendor-neutral basis.
- Grew to cover all of PDF following publication of the PDF Reference 1.7 as ISO 32000 in 2008.
- Became a standards development organization to maintain and advance PDF technology on behalf of all stakeholders.
- Today 6 / 19 Working Groups have accessibility as their direct or indirect purpose.
- In 2024, began a collaboration with ARIA WG to complete and standardize the mapping of PDF semantics to web accessibility APIs (PDF-AAM).



2006



2011



2019

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Artifact structure elements

https://github.com/w3c/aria/issues/2944

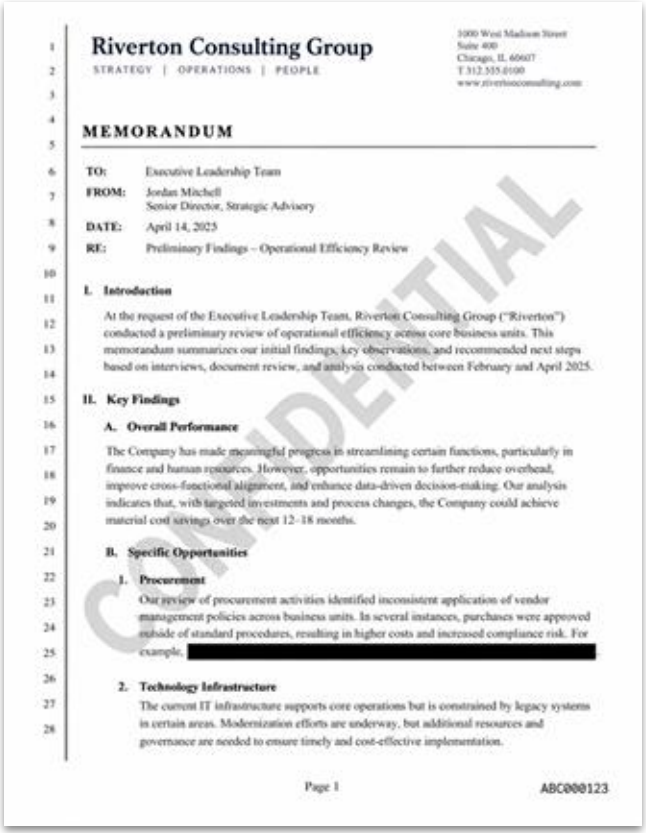


PDF 2.0's **Artifact** structure element

Content that may not be relevant to readers depending on the nature of their engagement.

"positional semantics" – the artifact's meaning is derived from its location in the structure tree relative to the document's real content.

NOTE: The **Artifact** structure element was added in PDF 2.0 (ISO 32000-2 (2017)) to support semantics unsupported by PDF's "traditional" artifacts defined by marked content sequences.



Riverton Consulting Group
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MEMORANDUM

TO: Executive Leadership Team
FROM: Jordan Mitchell
Senior Director, Strategic Advisory
DATE: April 14, 2025
RE: Preliminary Findings – Operational Efficiency Review

I. Introduction

At the request of the Executive Leadership Team, Riverton Consulting Group ("Riverton") conducted a preliminary review of operational efficiency across core business units. This memorandum summarizes our initial findings, key observations, and recommended next steps based on interviews, document review, and analysis conducted between February and April 2025.

II. Key Findings

A. Overall Performance

The Company has made meaningful progress in streamlining certain functions, particularly in finance and human resources. However, opportunities remain to further reduce overhead, improve cross-functional alignment, and enhance data-driven decision-making. Our analysis indicates that, with targeted investments and process changes, the Company could achieve material cost savings over the next 12–18 months.

B. Specific Opportunities

1. **Procurement**

Our review of procurement activities identified inconsistent application of vendor management policies across business units. In several instances, purchases were approved outside of standard procedures, resulting in higher costs and increased compliance risk. For example, [redacted]

2. **Technology Infrastructure**

The current IT infrastructure supports core operations but is constrained by legacy systems in certain areas. Modernization efforts are underway, but additional resources and governance are needed to ensure timely and cost-effective implementation.

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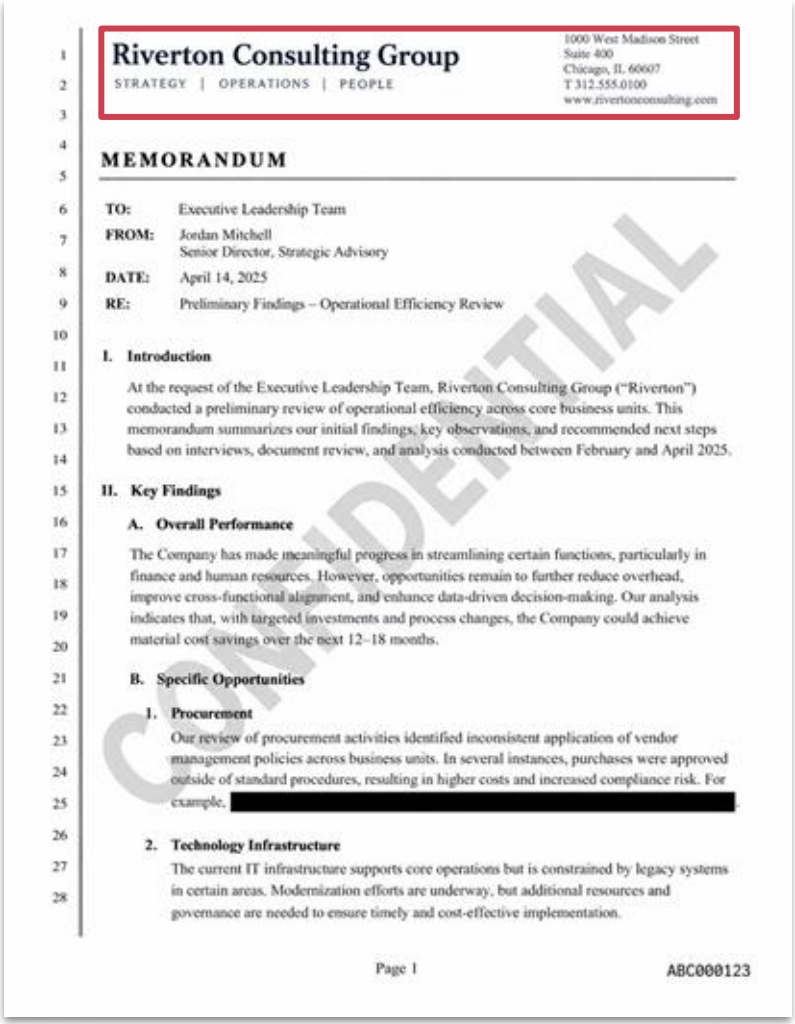
Letterhead



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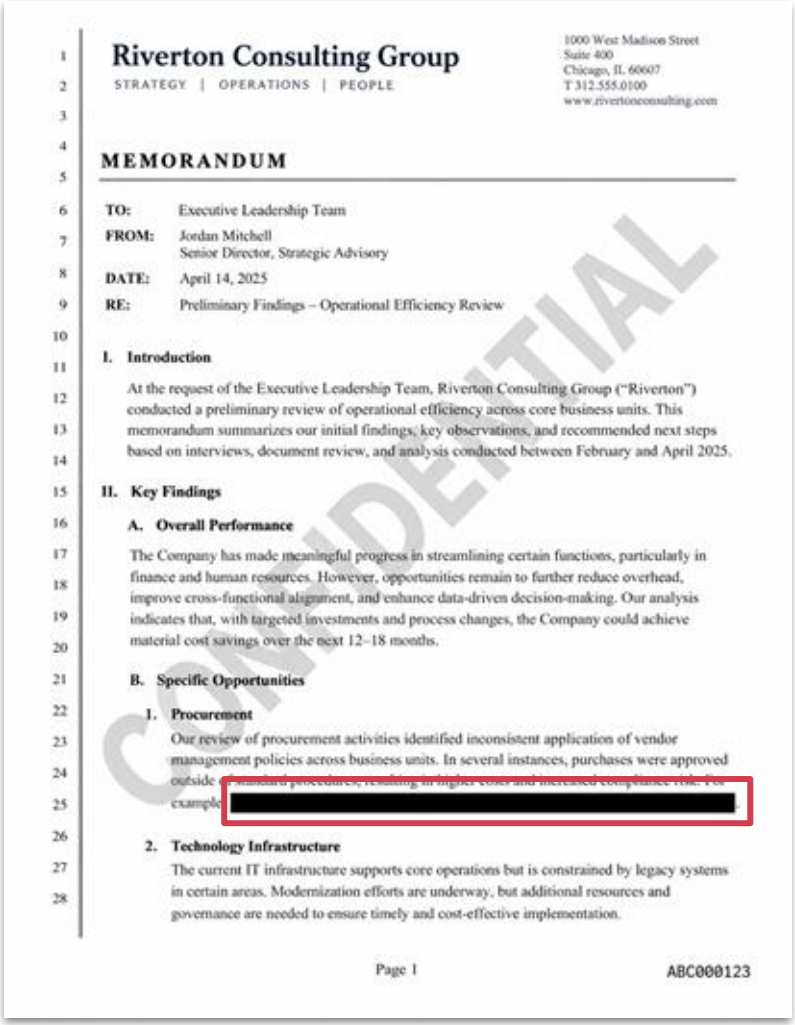
Redaction



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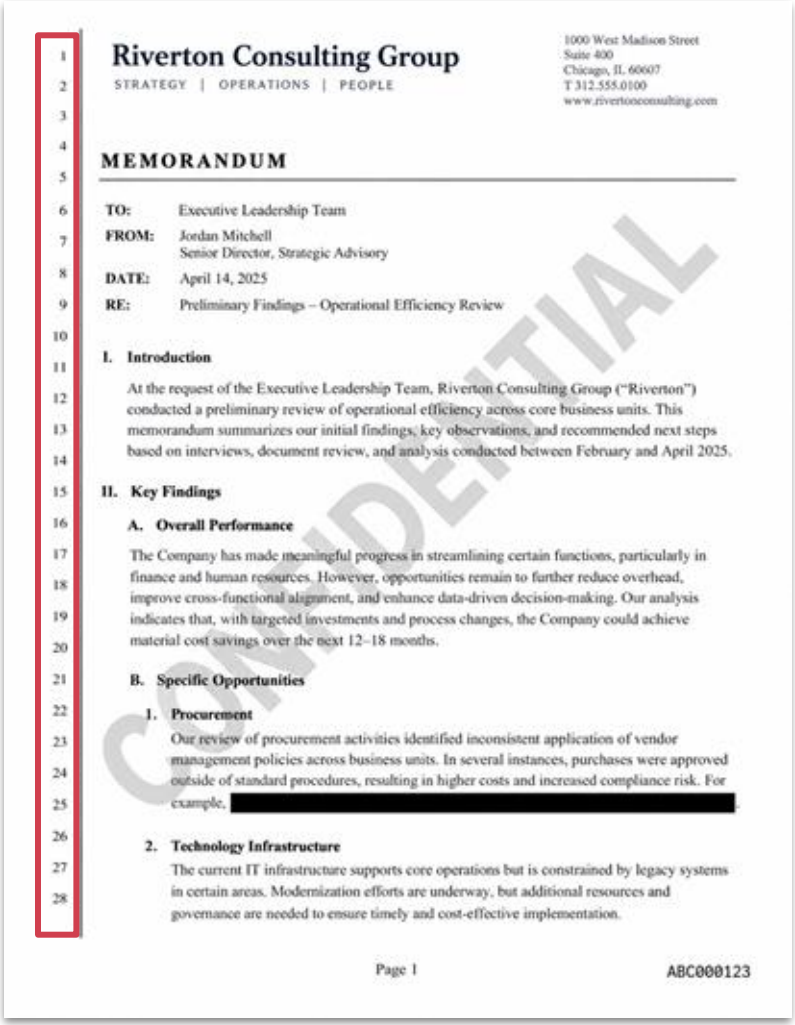
Line numbers



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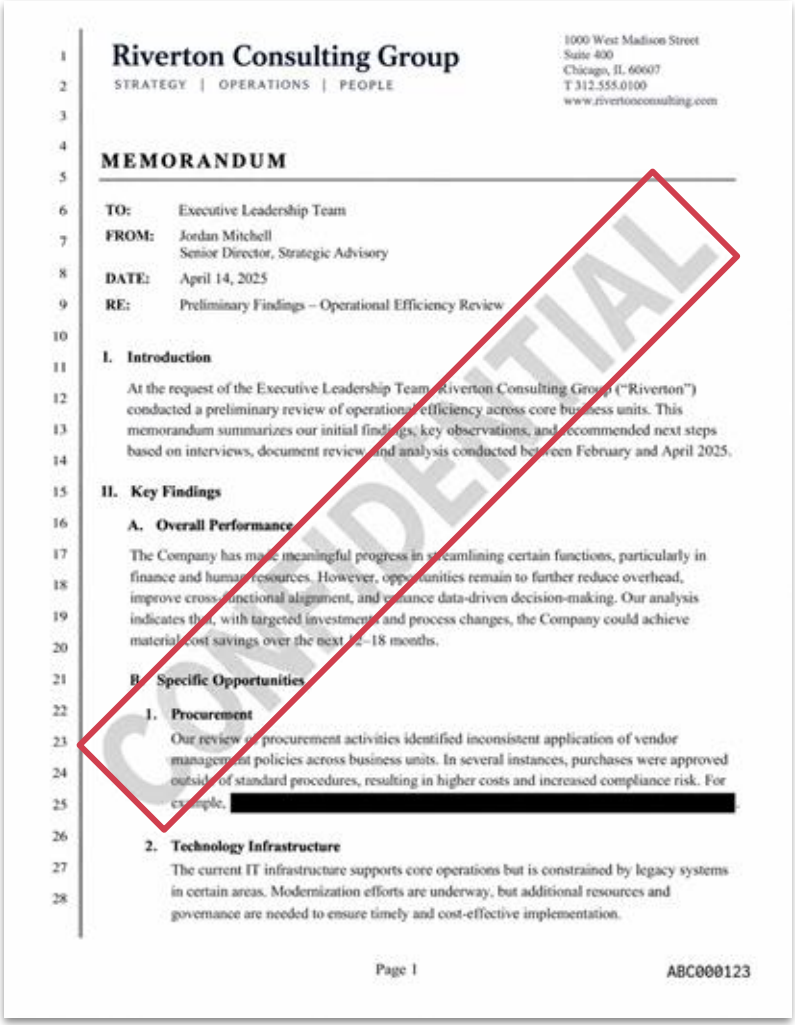
Watermark



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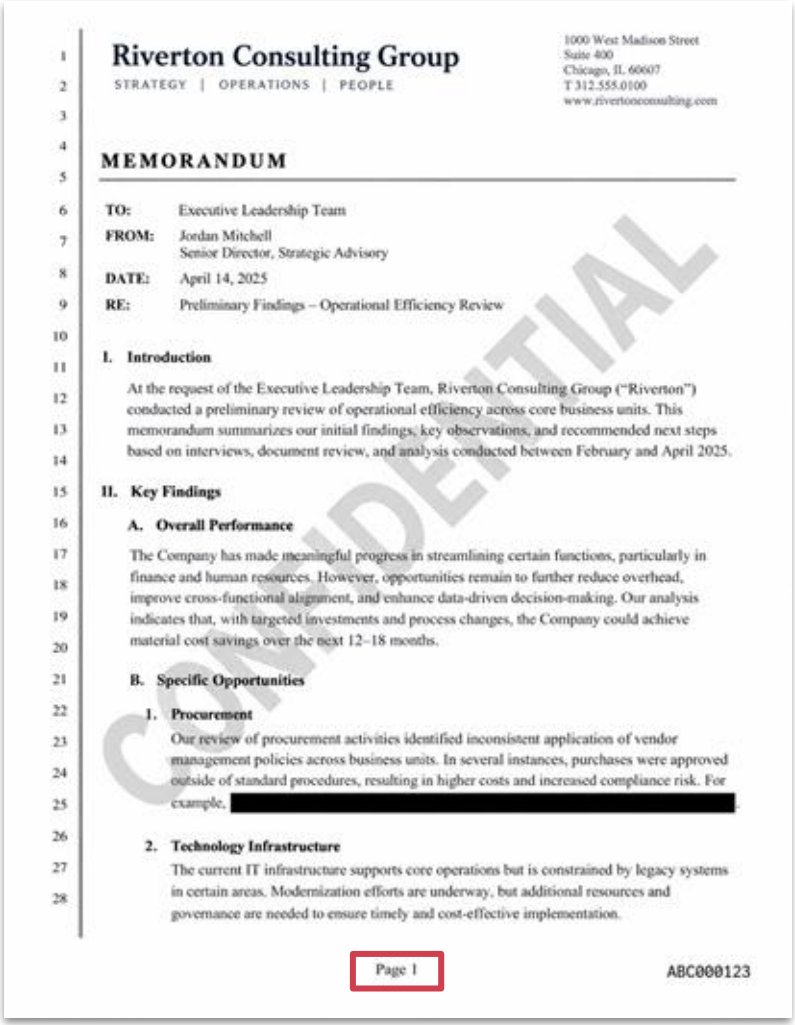

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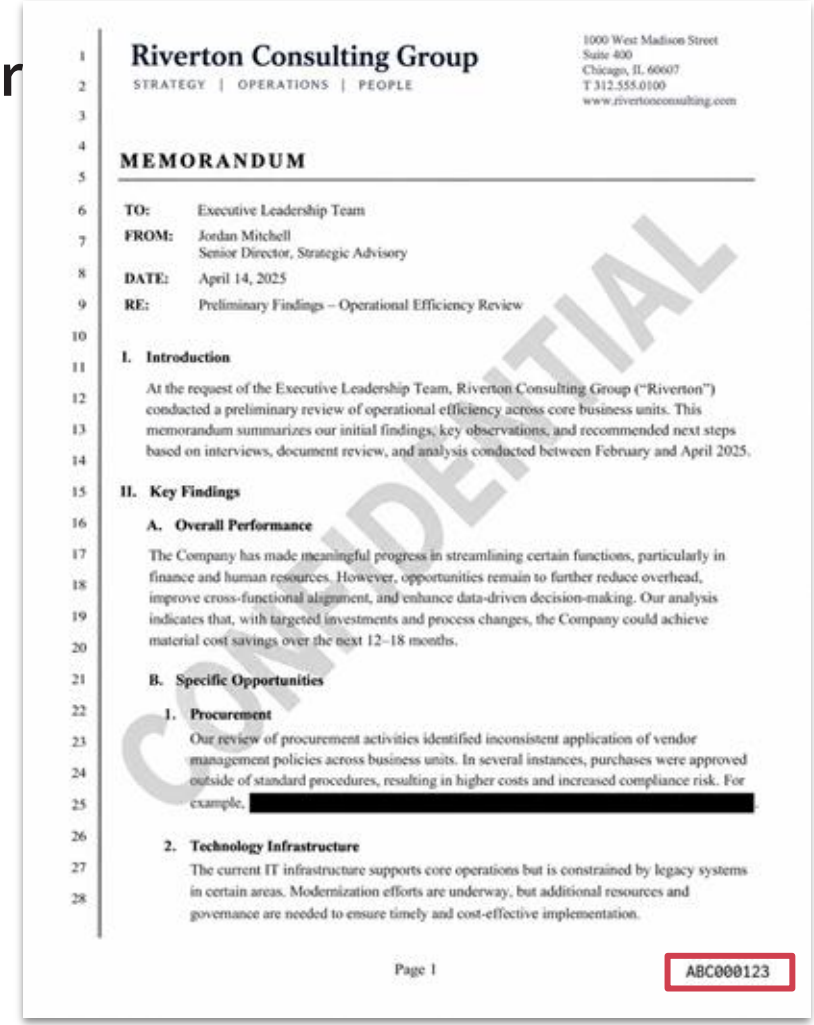
Bates number



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Artifact structure element type – expected behavior

If an **Artifact** structure element does not include a semantic type and subtype the appropriate treatment is equivalent to `aria-hidden`.

If an **Artifact** structure element does include a semantic subtype, a user should be presented with subtype-specific options for experiencing such content.

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Title structure elements

https://github.com/w3c/aria/issues/2943



Use cases for the Title structure element type

- An article’s principal title + subtitle.
- A government document’s title may include the issuing agency, document type, serial / index number, functional title, security classification, etc.
- A CAD (Computer Aided Design) engineering or architecture document’s title block often contains structured, domain-specific information.
- Legal documents often include formal material at the beginning that identifies the parties, court, case number, etc.
- A document title may include substructures such as multiple paragraphs or a list, e.g. “A Resolution Honoring the Lives and Service of Officer John Doe, Sergeant Jane Smith, and Captain Robert Johnson".

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Characteristics of PDF's **Title**

- PDF title content may include substructure, such as multiple paragraphs, a list, or math.
- PDF documents (typically longer or highly-structured) that include content tagged with **Title** also generally include one or (typically) more **H1** structure elements as top-level headings.
- Does not map to `<h1>` since it does not represent a level in a heading hierarchy, but groups content orthogonally to heading levels.

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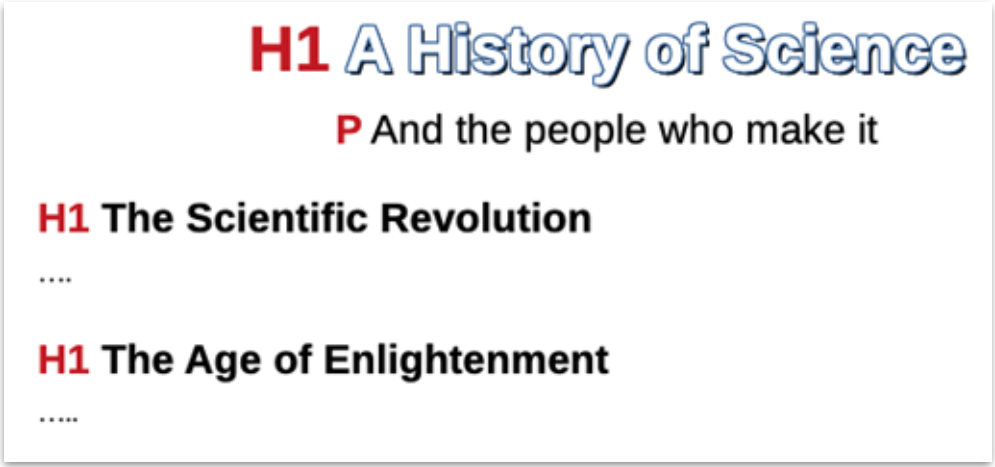
When there's >1 H1 and the styling differs…




```
<h1 class="book-title">A History of Science</h1>
<p  class="book-subtitle" role="doc-subtitle">And the people who make it</p>
<h1 class="chapter-title">The Scientific Revolution</h1>
...
<h1 class="chapter-title">The Age of Enlightenment</h1>
```

Q: Does a page that tags both a document's title and its top-level headings with `<h1>`, but styles them distinctively, fail WCAG's F2?

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PDF 2.0 preserves the author's semantics



Document	
Title	A History of Science
P	And the people who make it
H1	The Scientific Revolution
…	…
H1	The Age of Enlightenment
…	…

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Current implementations of title semantics

Google Docs, MS Word, LibreOffice and LaTeX all support:







- Distinct stylings for content marked as Title vs. heading level 1.
- Authors including multiple instances of heading level 1.

On export, both Google Docs and MS Word currently drop explicit title semantics:

- When exporting to HTML, both implementations map the title to `<p>`.
- When exporting to PDF, both implementations map the title to H1.

OpenDocument (LibreOffice, Collabra, etc) however, supports PDF 2.0:

- When exporting to HTML LibreOffice maps the title to `<h1>`.
- When exporting to PDF 2.0, LibreOffice maps the title to **Title**.

LaTeX also supports PDF 2.0, and can include ARIA to facilitate mapping to current accessibility APIs:

- LaTeX to HTML converters typically map the LaTeX title to `<h1>`.
- When exporting to PDF 2.0, LaTeX can be configured to map the title to either **Title** or **H1** (default is **Title**), and optionally add `role=heading aria-level=1`

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Title structure element type – expected behavior

AT announces “title” then reads the content (analogous to announcing a list).

Software continues to target **H1** as the top of a given document (or sub-document’s) heading hierarchy.

Software should facilitate hierarchical iteration through superior and inferior titles and their respective headings.

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GitHub https://github.com/pdf-association/
LinkedIn https://www.linkedin.com/company/pdf-association/



Working Groups related to accessibility:

- **PDF Accessibility LWG** – publishing Techniques for Accessible PDF
- **PDF/UA Processor LWG** – PDF-AAM and related projects
- **LaTeX Project LWG** – publishing guidance on accessible STEM documents based on PDF 2.0
- **PDF Reuse TWG** – developed Well-Tagged PDF (WTPDF), also published as ISO 14289-2 (PDF/UA-2)
- **PDF/UA TWG** – published the Matterhorn Protocol, co-developed PDF/UA-2 with Reuse TWG
- **Deriving HTML from PDF TWG** – just published its 1.2 specification based on WTPDF

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