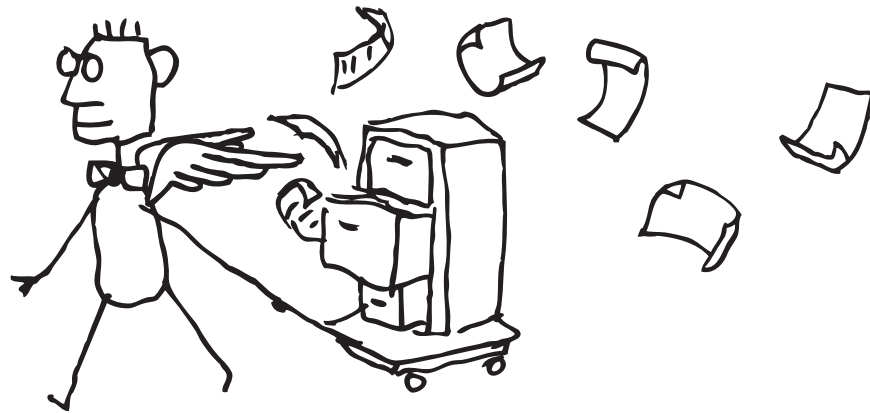


A Technical Introduction to PDF/A



 PDFlib® Whitepaper

The PDF/A Family of Archiving Standards

PDF/A is targeted at reliable long-time preservation of digital documents with text, raster images and vector graphics as well as associated metadata. The PDF/A format specified in the ISO 19005 standard strives to provide a consistent and robust subset of PDF which can faithfully be reproduced even after a long archiving period, or used for reliable data exchange in enterprise and government environments. This whitepaper discusses important technical aspects of PDF/A-1, PDF/A-2 and PDF/A-3.

PDF/A-1 PDF/A-1, the first standard within a series of multiple parts, has been published in 2005 as ISO 19005-1. It is based on PDF 1.4 (the file format of Acrobat 5) and imposes some restrictions regarding the use of color, fonts, annotations, and other elements. There are two flavors of PDF/A-1:

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PDF/A-2 The PDF world advanced a lot since the publication of PDF/A-1. Among many other milestones, PDF 1.7 (the file format of Acrobat 8) has been standardized as ISO 32000-1 in 2008. In order to make numerous new PDF features available in PDF/A workflows, a new part of the standard called PDF/A-2 has been published in 2011 as ISO 19005-2.

PDF/A-2 is based on PDF 1.7 and includes many useful additions which are not available in PDF/A-1. These include important file format aspects such as JPEG 2000 compression, optional content (layers), PDF packages and others. PDF/A-2 documents may contain file attachments provided the attached documents themselves conform to PDF/A-1 or PDF/A-2.

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PDF/A-2 does not make PDF/A-1 obsolete or force users to migrate to the newer version – after all, this would be absurd for a standard which is targeted at long-time preservation!

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 - ▶ File attachments are associated with the whole document, a page, or some other part of the document. The relationship between the attached file and the corresponding part of the document must be specified explicitly, e.g. source, alternative, or supplemental data.

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PDF/A viewers are not required to do anything specific with attached non-PDF/A files except for extracting them. The PDF/A standard does not guarantee that attachments can be viewed or otherwise used in the future – it simply allows their presence in an archivable document.

In the same spirit as PDF/A-2 which does not replace PDF/A-2, PDF/A-3 does not replace PDF/A-2. Any part of the PDF/A standard can be used for long term archival as appropriate.

Technical Concepts in PDF/A

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- ▶ Encryption must not be used to make sure that the documents contents can always be accessed without any restriction.
- ▶ Certain requirements for annotations and form fields ensure that the visualization is fixed and that screen and print representation are identical.

In addition to these straight-forward requirements, however, PDF/A requires various other PDF features which are more subtle (e.g. certain entries in font data structures), and prohibits some critical structures (e.g. certain combinations of TrueType fonts and encodings). There are many aspects which must be implemented and checked by software developers before they arrive at fully standard-conforming PDF/A products. PDF/A is much more than simply »PDF with embedded fonts and no encryption«!

Additional restrictions in PDF/A-1

PDF/A-1 somehow suffers from the fact that it was the first in the PDF/A family: the standard was created at a time when important PDF concepts were not yet ready for prime time. As a result, the following features are prohibited in PDF/A-1, but are allowed in the newer parts PDF/A-2 and PDF/A-3:

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Device-independent color specification

In order to ensure consistent color reproduction across output devices and time, PDF/A requires the use of device-independent color, usually achieved via ICC profiles or CIE Lab color specifications. The optional output intent describes the color characteristics of the document. While these concepts are widely used in the graphic arts industry, enterprise PDF developers are not necessarily familiar with color management and must familiarize themselves with ICC profiles and related concepts.

Raster images, e.g. TIFF and JPEG, play a vital role in document creation. Scanned paper documents and photographs from digital cameras are common examples of raster image data in document workflows.

In many cases raster image data in modern workflows is already device-independent, usually by means of an embedded ICC color profile or standardized color spaces such as sRGB. Such images are ready for use in PDF/A. However, legacy image data is in many cases device-dependent, such as black-and-white or RGB scans without any associated ICC profile.

XMP metadata and extension schemas

Extensible Metadata Platform (XMP) is an XML-based format modeled after W3C's RDF (*Resource Description Framework*) which forms the foundation of the semantic Web initiative. In 2012 XMP has been standardized as ISO 16684-1. PDF/A mandates the use of XMP metadata for storing information about a document inside the PDF itself. XMP provides a powerful and flexible framework for storing standard and custom metadata properties (see our separate Whitepaper on XMP).

The XMP specification includes more than a dozen predefined schemas with hundreds of properties for common document and image characteristics. The most widely used predefined XMP schema is called the Dublin Core. It includes properties such as Title, Creator, Subject, and Description.

XMP is extensible by its very nature, i.e. company- or industry-specific metadata requirements can be met by constructing custom schemas. PDF/A supports this concept. However, in order to ensure automated retrieval PDF/A mandates that a machine-readable description of the custom metadata must be embedded in the document. This is achieved with an »XMP extension schema description«: a standardized part of the XMP metadata describes the structure of custom XMP metadata properties.

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Level A conformance also requires that all text in the document has Unicode semantics available (see below) and that logical words are separated by space characters.

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As an example, code 0x1A in the common WingDings font contains an image of a computer keyboard with the glyph name *keyboard* and the PUA Unicode value U+F037. For lack of better substitute text the glyph name could be used to construct suitable ActualText, e.g. »symbol for keyboard«. It should be noted that programmatically constructing ActualText must be considered a makeshift solution; human-selected text is always preferable to machine-generated ActualText.

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Splitting and Merging

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- ▶ A small operation such as adding a metadata field may violate the standard unless the software properly implements the rules for XMP metadata as mandated by PDF/A.

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