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Graphic technology — Variable content replacement —

Part 1: Using PDF/X for variable content replacement (PDF/VCR-1)

Technologie graphique — Remplacement du contenu variable —

Partie 1: Utilisation de PDF/X pour le remplacement du contenu variable (PDF/VCR-1)

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

A list of all parts in the ISO 16613 series can be found on the ISO website.

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Introduction

This document describes the use of PDF as a variable content page template for printing applications where variable content data is substituted into the template live in real time immediately ahead of the rendering and printing processes. In most cases, a conforming processor comprises an integrated merge, render and print engine and the graphical representation of each merged page is stored only temporarily in memory until output.

In this type of template-based variable data driven print workflow, the variable substitution content data to be later merged with the template for printing is typically generated and then transferred into production in a data exchange separate from the exchange of the static content template.

In another type of workflow, the variable substitution content is generated during production by a processor present in the production workflow. This processor can use static source data as input, such as data from a database, and generate the substitution content on the fly. It can also use live source data, or both live and static source data where the live source data is acquired, e.g. from scanners during production.

This differs from the use of ISO 16612-2 (PDF/VT) where conforming PDF/VT files instead represent fully composed variable content documents that are the result of an arbitrarily complex, possibly template-based, data driven composition or merge process. Thus, pages of PDF/VT documents represent final form mastered documents that can be exchanged as a single file with static and variable content already combined and the final form representation remains after output is completed.

This document is targeted to enable the following requirements for printing using live content substitution:

— long runs;

— closed loop print verification and reprint recovery;

— immediate start of printing;

— fixed speed without pause (due to roll-based transportation of the media);

— low latency real-time processing (e.g. allow for camera-based determination of variable data and then merge, render and print in real time;

— capability to keep security-related information only temporarily;

— allow for spontaneous changes in print order (selectively reprinting bad records).

Use cases of printing using live content substitution are described in Annex B.

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Graphic technology — Variable content replacement —

Part 1:
Using PDF/X for variable content replacement (PDF/VCR-1)

1 Scope

This document enables variable data printing applications using PDF template-based variable content substitution where

— a PDF template file containing pages with variable content substitution fields (placeholders) is delivered ahead of a print production run and may be reused across multiple print production runs, and

— PDF-based variable data substitution content is provided during print production and merged with the PDF template to produce final form variable content page output.

This document defines PDF/VCR (PDF for variable content replacement), a set of base technical requirements for a PDF template file format, a PDF-based variable data substitution content format and a framework for in-RIP variable content merging. The PDF/VCR base technical requirements do not include writer and processor conformance.

This document also defines the PDF/VCR-1 conformance level which is based on the PDF/VCR base technical requirements and defines conformance requirements for:

— the PDF/VCR-1 template file format;

— the PDF/VCR-1 data sequence format, a variable data substitution content format;

— a PDF/VCR-1 writer, a software application which can generate PDF/VCR-1 template files;

— a PDF/VCR-1 data provider, a software application which can generate PDF/VCR-1 data sequences;

— a PDF/VCR-1 processor, a software application which can perform substitution (replacement) of PDF/VCR-1 template placeholder objects with substitution content provided within a PDF/VCR-1 data sequence.

NOTE 1 Additional conformance levels can be added at a later time based on the same PDF/VCR base technical requirements.

NOTE 2 A conforming PDF/VCR-1 template file contains all necessary information for variable content printing by adding matching substitution content. Generating the substitution content usually requires additional information not present in the template file.

The template file format defined in this document is based on the ISO 15930 (PDF/X) family of standard formats for the representation of a single or multiple page template containing both static content and stylized variable content placeholders.

The variable data format defined in this document is based on the CSV file format defined in RFC 4180. It supports the representation of substitution content data that can be merged into the template's variable content placeholders to produce complete page content utilizing the full PDF graphics model.

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2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 15930 (all parts)[1], *Graphic technology — Prepress digital data exchange using PDF*

ISO 15930-7:2010[2], *Graphic technology — Prepress digital data exchange using PDF — Part 7: Complete exchange of printing data (PDF/X-4) and partial exchange of printing data with external profile reference (PDF/X-4p) using PDF 1.6*

ISO 32000 (all parts)[3], *Document management — Portable document format*

RFC 3629, *UTF-8, a transformation format of ISO/IEC 10646*

RFC 4180:2005, *Common Format and MIME Type for Comma-Separated Values (CSV) Files*

Adobe PDF Reference, fifth edition, version 1.6, Adobe Systems Incorporated (ISBN 0-321-30474-8)[4]

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms, definitions and abbreviated terms apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
application template file
file maintained by a VDP application containing one or more pages containing static content and variable content substitution *placeholders* (3.31)

3.2
BBox
bounding box of a *placeholder object* (3.32), given in user coordinates

3.3
CSV file
Comma Separated Values file
file consisting of records where each record contains multiple values separated by the ASCII COMMA (‘,’) character

3.4
form XObject
self-contained description of an arbitrary sequence of graphics objects, as defined in the applicable version of the PDF Reference

Note 1 to entry: The term is defined in the PDF 1.6 Reference, section 4.9.

Note 2 to entry: See Clause 5 for “applicable version of the PDF Reference” and “PDF 1.6 Reference”.

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1) ISO 15930 is a multi-part standard defining several versions of PDF/X. For each part, the latest edition applies.

2) Examples are given in, and application requirements refer to PDF/X-4 as defined in, ISO 15930-7.

3) ISO 32000 is a multi-part standard defining several versions of PDF.

4) Version 1.6 of the Adobe PDF Reference is used for examples and for references to definitions of PDF features, including section references. Available from www.npes.org/standards/toolspdfx.html.

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3.5
generator
method which outputs a PDF marked content sequence or XObject *stream* (3.35)

3.6
GTS_ prefix
second class name prefix used for Graphic Arts Technologies Standards

3.7
identifier
MCID (3.13) of a marked content element or indirect reference to an XObject which establishes the connection between a *placeholder* (3.31) and its *placeholder object* (3.32)

3.8
image XObject
representation of a sampled visual image by a *stream* (3.35) object whose dictionary specifies attributes of the image and whose data contains the image samples, as defined in the applicable version of the PDF Reference

Note 1 to entry: The term is defined in the PDF 1.6 Reference, section 4.8.

3.9
live data
data read from an input device while the PDF template file is output

3.10
logical structure
hierarchy of *structure elements* (3.36) in a PDF document describing structural aspects of the document (as opposed to printable elements), as defined in the applicable version of the PDF Reference

Note 1 to entry: The term is defined in the PDF 1.6 Reference, section 10.6.

3.11
marked content element
part of a PDF content *stream* (3.35) marked by PDF operators for specific handling by applications, as defined in the applicable version of the PDF Reference

Note 1 to entry: The term is defined in the PDF 1.6 Reference, section 10.5.

3.12
marked content sequence
PDF content between the **BMC/BDC** and **EMC** operators of a *marked content element* (3.11), as defined in the applicable version of the PDF Reference

Note 1 to entry: The term is defined in the PDF 1.6 Reference, section 10.5.

3.13
MCID
unique *identifier* (3.7) of a *marked content element* (3.11)

3.14
merge/render engine
application which reads a PDF template file and, upon receiving a *PDF/VCR data record* (3.17), merges the content with the template file

3.15
name
PDF name object identifying a field in a data record

3.16
PDF/VCR data field
name/value pair

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3.17
PDF/VCR data record
set of *PDF/VCR data fields* (3.16)

3.18
PDF/VCR data sequence
sequence of *PDF/VCR data records* (3.17)

Note 1 to entry: A PDF/VCR data sequence is a sequence of PDF/VCR data records where each PDF/VCR data record is a set of *PDF/VCR data fields* (3.16), i.e. name/value pairs.

3.19
PDF/VCR template file
PDF file containing one or more pages containing *placeholders* (3.31)

3.20
PDF/VCR version
value of the **pdfvcrid:GTS_PDFVCRVersion** property present in the document metadata *stream* (3.35) associated with the **Metadata** key in the document catalog dictionary

Note 1 to entry: A conformance level, e.g. PDF/VCR-1.

3.21
PDF/VCR-1 data field
PDF/VCR data field (3.16), where the value is valid PDF/VCR-1 *substitution content* (3.38)

3.22
PDF/VCR-1 data provider
application that is able to provide PDF/VCR-1 data sequences matching *PDF/VCR-1 template files* (3.27)

3.23
PDF/VCR-1 data record
set of *PDF/VCR-1 data fields* (3.21)

Note 1 to entry: A set of name/value pairs defining the PDF/VCR-1 *substitution content* (3.38) for each *placeholder* (3.31).

3.24
PDF/VCR-1 data sequence
sequence of *PDF/VCR-1 data records* (3.23)

Note 1 to entry: A sequence of PDF/VCR-1 data records where each record is a set of *PDF/VCR-1 data fields* (3.21), i.e. name/value pairs where the value is valid PDF/VCR-1 *substitution content* (3.38).

Note 2 to entry: A PDF/VCR-1 data sequence is a special case of a *PDF/VCR data sequence* (3.18).

3.25
PDF/VCR-1 processor
application that is able to read *PDF/VCR-1 template files* (3.27) and *PDF/VCR-1 data sequences* (3.24), merge the content with the template file, and output (e.g. render) the merged result

3.26
PDF/VCR-1 reader
application that is able to read and appropriately process *PDF/VCR-1 template files* (3.27) and *PDF/VCR-1 data sequences* (3.24)

Note 1 to entry: A PDF/VCR-1 reader might be a preflighter.

3.27
PDF/VCR-1 template file
PDF file containing one or more pages containing *placeholders* (3.31) where the *PDF/VCR version* (3.20) is PDF/VCR-1

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3.28
PDF/VCR-1 writer
application that is able to write *PDF/VCR-1 template files* (3.27)

3.29
PDF/X
PDF conformance levels defined in the parts of ISO 15930

EXAMPLE PDF/X-4 is a conformance level defined in ISO 15930-7.

3.30
PDF/X conformance level
PDF conformance level defined in any part of ISO 15930

3.31
placeholder
PDF *structure element* (3.36) which references a *placeholder object* (3.32) and defines the details of replacement for the placeholder object, e.g. a *name* (3.15) identifying a field in a *PDF/VCR data record* (3.17)

3.32
placeholder object
PDF content serving as a sample of what is to be replaced

3.33
replacement root
PDF *structure element* (3.36) that indirectly references all *placeholders* (3.31) in a PDF/VCR template

3.34
static data
data completely prepared before the PDF template file starts printing

3.35
stream
dictionary that describes a sequence of bytes, followed by zero or more lines of bytes bracketed between the keywords **stream** and **endstream**, as defined in the applicable version of the PDF Reference

Note 1 to entry: The term is defined in the PDF 1.6 Reference, section 3.2.7.

3.36
structure element
PDF object representing one element of the *logical structure* (3.10), as defined in the applicable version of the PDF Reference

Note 1 to entry: The term is defined in the PDF 1.6 Reference, section 10.6.1.

3.37
structure tree
tree of *structure elements* (3.36) in a PDF document expressing its *logical structure* (3.10), as defined in the applicable version of the PDF Reference

Note 1 to entry: The term is defined in the PDF 1.6 Reference, section 10.6.1.

Note 2 to entry: The subtree of the structure tree describing the replacement in a PDF template file may be only one of several subtrees of the structure tree in that file.

3.38
substitution content
PDF fragment that can be substituted for the sample content of a *placeholder object* (3.32)

3.39
UTF-8
Unicode Transformation Format – 8-bit (Unicode 8-bit character encoding)

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3.40
VDP
variable data printing

3.41
white space character
character separating syntactic constructs such as names and numbers from each other, as defined in the applicable version of the PDF Reference

Note 1 to entry: The term is defined in the PDF 1.6 Reference, Table 3.1.

4 Notations

PDF operators, PDF keywords, the names of keys in PDF dictionaries, and other predefined names are written in bold; for example, the key **GTS_Generator**.

Operands of PDF operators or values of dictionary keys are written in italic; for example, the *PassThrough* value for the **GTS_Generator** key.

An italic font is also used to introduce key concepts or reference specific terms of importance.

5 Relation to other standards

This document is defined by reference to parts of ISO 15930 (PDF/X) each of which is in turn defined by reference to the *Adobe PDF Reference* or to a part of ISO 32000 (PDF).

As defined in 7.2.2, a PDF/VCR compliant file shall comply with a specific part of ISO 15930. Further, it shall define structure elements and PDF content in compliance with the applicable version of the PDF Reference as defined below.

For the purposes of this document, references to the "applicable version of the PDF Reference" refer to the version of the *Adobe PDF Reference* or the part of ISO 32000 as required by the part of ISO 15930 to which a PDF/VCR file claims to be compliant.

NOTE 1 The PDF features used in this document are identical (sufficiently similar) in all applicable versions of the PDF Reference. Therefore, such references are not distinguished.

For the purposes of this document, references to "PDF 1.6 Reference" refer to the *Adobe PDF Reference, fifth edition, version 1.6*.

NOTE 2 For example, if the **pdfxid:GTS_PDFXVersion** key of the PDF/VCR template file is PDF/X-4, then the required part of ISO 15930 is ISO 15930-7, and the applicable version of the PDF Reference is the PDF 1.6 Reference.

6 Workflow

An example of the generalized workflow of a system utilizing content substitution is presented in Figure 1.

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