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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)

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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.

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.

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.

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”.

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.

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

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

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)

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.

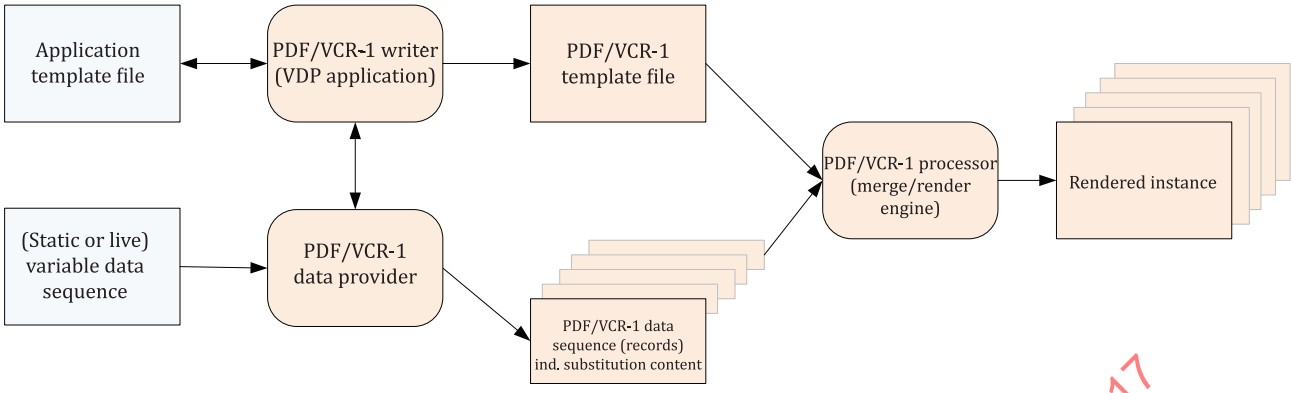

Figure 1 — System using content substitution

The PDF/VCR-1 writer (VDP application) reads the application template file (in its native format) and produces a PDF/VCR-1 template file containing placeholders. Each placeholder refers to a placeholder object.

The PDF/VCR-1 data provider reads a data sequence from a static or live data source or a combination of both and outputs a corresponding PDF/VCR-1 data sequence containing substitution content for each placeholder in the PDF/VCR-1 template file.

NOTE The PDF/VCR-1 data provider is likely to need access to the application template file to produce its output. The PDF/VCR-1 data provider can be the same application as the PDF/VCR-1 writer.

The PDF/VCR-1 processor repeatedly receives a PDF/VCR-1 data record containing substitution content, substitutes each placeholder object with the corresponding substitution content, and outputs (e.g. renders) the PDF/VCR-1 template file as updated by the substitution content.

The above diagram illustrates the conceptual functions of conforming applications. Conforming applications may achieve the required functionality also using a different architecture.

Elements of the architecture shown in orange are considered within the scope of this document.

7 PDF/VCR: Base requirements

7.1 General

The PDF/VCR base requirements define a template file format (PDF/VCR template file) and a variable data format (PDF/VCR data sequence). They do not define a conformance level on their own. Conformance levels like PDF/VCR-1 may be defined on top of them; see Clause 8.

7.2 PDF/VCR template file base requirements

7.2.1 General

A *PDF/VCR template file* shall conform to the requirements specified for PDF/VCR template files in this subclause.

7.2.2 PDF/VCR template file identification

A PDF/VCR template file shall be a conforming PDF file as defined in any part of ISO 15930, except ISO 15930-1 to ISO 15930-6.

NOTE 1 This means that the PDF/VCR template file can be also identified, for example, as a PDF/X-4 file as defined in ISO 15930-7. In this case, the PDF/VCR template file also adheres to the PDF 1.6 Reference as required by ISO 15930-7.

NOTE 2 Version 1.6 of the Adobe PDF Reference (which is referenced by ISO 15930-7) supports all features required in PDF/VCR, in particular, logical structure and XMP metadata. Other versions of the PDF Reference are referenced via the part of ISO 15930 to which a PDF/VCR template file claims to be compliant.

A PDF/VCR template file shall be identified using the **pdfvcrid:GTS_PDFVCRVersion** property defined in Table 1 and present in the document metadata stream associated with the **Metadata** key in the document catalog dictionary as required in ISO 15930-7:2010, 6.10.1.

Neither the version number in the header of a PDF file, nor the value of the **Version** key in the catalog dictionary of a PDF file shall be used in determining whether a file is in accordance with the PDF/VCR requirements.

The prefix **pdfvcrid** with the namespace identifier http://www.npes.org/pdfvcr/ns/id/ shall always be used as shown in Table 1.

Table 1 — PDF/VCR identification property

Property	Value type	Category	Description
pdfvcrid:GTS_PDFVCRVersion	Text	Internal	PDF/VCR conformance level identifier

Each conformance level (e.g. *PDF/VCR-1*, see 8.2) shall adhere to the base requirements (PDF/VCR), define a unique value for the **pdfvcrid:GTS_PDFVCRVersion** property, and adhere to the conformance requirements defined for this value of the **pdfvcrid:GTS_PDFVCRVersion** property.

7.2.3 PDF/VCR template file content

A PDF/VCR template file shall contain a structure tree as specified in 7.2.4.

A PDF/VCR template file shall contain the following elements supporting variable data replacement in the structure tree:

— field names (names of PDF/VCR data fields expected in the PDF/VCR data records of a PDF/VCR data sequence) as specified in 7.2.5;

— placeholders (logical structure elements identifying placeholder objects) as specified in 7.2.7;

— placeholder objects (sample content which is subject to replacement) as specified in 7.2.8.

7.2.4 Logical structure

A PDF/VCR template file shall contain a structure tree.

NOTE The root of the structure tree is a dictionary object called the structure tree root, located by means of the **StructTreeRoot** entry in the document catalog dictionary.

The structure tree shall contain a *replacement root*, a structure element which is a direct descendent of the **StructTreeRoot** entry in the document catalog dictionary of the PDF/VCR template file. The replacement root structure element shall have an attribute object **A**, called *template attribute*, whose attribute owner (**O**) is **GTS_Template**.

The *template attribute* of the PDF/VCR template file is defined to be the template attribute of the replacement root structure element present in the structure tree of the PDF/VCR template file.

7.2.5 Data fields

As defined in 7.3, 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 and each *PDF/VCR data field* is a name/value pair.

The names expected as field names in the PDF/VCR data records of each PDF/VCR data sequence matching a given PDF/VCR template file shall be defined in the structure tree of the PDF/VCR template file as specified below.

The template attribute of the PDF/VCR template file shall contain an entry **GTS_Fields**. The value of the **GTS_Fields** entry shall be an array of name objects.

The set of names contained in the **GTS_Fields** array determines the set of names expected as field names, i.e. the set of names required to be present as the name of a PDF/VCR data field in each PDF/VCR data record of each matching PDF/VCR data sequence as defined in 7.3.

The set of names contained in the **GTS_Fields** array determines the names that may be used as the value of the **GTS_Pages** entry of the template attribute of the PDF/VCR template file as defined in 7.2.6.

The set of names contained in the **GTS_Fields** array determines the names that may be used as or within the value of the **GTS_Data** entry of each placeholder of the PDF/VCR template file as defined in 7.2.9.

The set of names contained in the **GTS_Fields** array shall not contain duplicates.

7.2.6 Page selection

A PDF/VCR template file may contain multiple pages.

The template attribute of the PDF/VCR template file may contain an optional entry **GTS_Pages**. If present, the value of the **GTS_Pages** entry shall be of type name. The name shall be contained in the **GTS_Fields** array contained in the template attribute of the PDF/VCR template file.

For a given PDF/VCR data sequence, the name (i.e. the value of the **GTS_Pages** entry) shall be matched by a field name, i.e. the name of a PDF/VCR data field, in each PDF/VCR data record as defined in 7.3. The value of that field in each PDF/VCR data record shall be an array of numbers in PDF syntax, each representing a page number in the PDF/VCR template file. The page numbers shall be zero based, listed in ascending order and shall match existing pages in the PDF/VCR template file in reader order.

EXAMPLE “[0 2 4]” selects only the odd pages (1, 3 and 5).

NOTE This enables conditional pages.

7.2.7 Placeholders

A placeholder defines the details of replacement for a placeholder object, e.g. a name identifying a PDF/VCR data field in each PDF/VCR data record of a PDF/VCR data sequence.

A *placeholder* shall be a structure element which is a descendent of the replacement root and contains an attribute object **A**, called *replacement attribute*, whose attribute owner (**O**) is **GTS_Replacement**. The replacement attribute is the part of the placeholder that contains the details of replacement for the placeholder.

The replacement root shall reference each placeholder as a (direct or indirect) child via its **K** entry.

NOTE 1 The K array of the replacement root can also contain entries not referring to a placeholder, but only to a static element.

A placeholder shall be a leaf structure element and shall reference (via its **K** entry, which shall contain only a single element) a placeholder object as specified in 7.2.8.

Further placeholder entries are defined in 7.2.9.

NOTE 2 Two placeholders cannot reference the same placeholder object. This is enforced by the rules about logical structure. This avoids an ambiguity during replacement.

7.2.8 Placeholder objects

A placeholder object is a sample PDF content.

A *placeholder object* shall be either

— a single marked content element, or

— an image or form XObject.

The sample content is subject to replacement by substitution content.

For a marked content element, the substitution content shall be a marked content sequence. Replacing the placeholder object replaces the marked content sequence of the placeholder object with the substitution content, preceded and followed by at least one white-space character.

NOTE 1 A marked content sequence is the PDF content between the BMC/BDC and EMC operators of a marked content element.

For an XObject, the substitution content shall be a stream defining an XObject. Replacing the placeholder object replaces the XObject stream of the placeholder object with the substitution content, preceded and followed by at least one white-space character.

NOTE 2 An XObject stream is the PDF content between the **obj** and **endobj** keywords of an XObject definition.

NOTE 3 The substitution mechanism allows replacing PDF content within marked content elements or within XObjects. It does not allow creating new resources.

The reference from a placeholder to a placeholder object shall be the placeholder's **K** entry. The reference shall be either the MCID of the marked content element or an indirect reference to the XObject.

7.2.9 Placeholder entries

The replacement attribute of each placeholder shall contain an entry **GTS_Generator** identifying a generator. A *generator* defines the method to obtain the substitution content for the placeholder during replacement.

Possible values of **GTS_Generator** depend on the PDF/VCR version of the PDF/VCR template file (for PDF/VCR-1, see 8.2).

The substitution content output by the generator shall be valid for the placeholder object (referred to by the **K** entry of the placeholder) where it is to be substituted.

A marked content sequence provided as substitution content is valid for a given placeholder object which is a marked content element if

— it conforms to the PDF syntax for a marked content sequence, and

— it refers only to objects or resources that are defined for the page referencing the content stream containing the placeholder object.

A stream provided as substitution content for an XObject is valid for a given placeholder object which is an XObject if

— it conforms to the PDF syntax for a stream,

— the stream defines an XObject with the same type as the type of the XObject that it replaces, and

— it refers only to objects or resources that are explicitly defined for the XObject.

The content of a placeholder object shall not contain other placeholder objects.

The substitution content shall not contain placeholder objects, i.e. contain IDs referred to by placeholders.

NOTE 1 Given the above requirements, additional glyphs, images and XObjects might have to be included in the PDF/VCR template file which will only be shown in substitution content.

NOTE 2 Substituting text when processing a PDF/VCR-1 file amounts to use of embedded fonts for the purpose of creating new or editing existing content. For such use, applicable legal implications of font licensing for embedded fonts need to be taken into account. Typically, a font license allowing for the use of a font embedded into a PDF file only for print or preview purposes is insufficient. Instead, it is usually necessary to obtain a font license that allows for editing content using the fonts embedded in a PDF file. Additional legal implication can apply, e.g. some font foundries only allow for embedding of font subsets.

The replacement attribute of each placeholder shall contain an entry **GTS_Data** providing parameters to the method for obtaining the substitution content for this placeholder.

Possible values of **GTS_Data** shall depend on the value of **GTS_Generator** (for PDF/VCR-1, see 8.2).

Each placeholder should contain an entry **GTS_BBox**, an array of four numbers in default user space units giving the coordinates of the left, bottom, right, and top edges of the placeholder, respectively.

If present, the **GTS_BBox** entry shall identify the area on the page whose appearance may change by applying substitution content to the placeholder object of this placeholder.

If a placeholder contains a **GTS_BBox** entry, the substitution content for this placeholder shall meet the following additional requirement: The appearance of the area outside the BBox of this placeholder shall not be affected by the replacement of the placeholder object of this placeholder by the substitution content.

NOTE 3 A conforming PDF/VCR-1 processor can use the information provided by the **GTS_BBox** entry as a hint for optimization.

NOTE 4 PDF/VCR-1 conforming writers can use XObjects to facilitate further optimization.

7.3 PDF/VCR data sequence conformance

A *PDF/VCR data sequence* provides the information to be used during replacement.

A *PDF/VCR data sequence* shall be a sequence of PDF/VCR data records. A *PDF/VCR data record* shall be a set of PDF/VCR data fields. A *PDF/VCR data field* shall be a name/value pair.

The set of *field names*, i.e. the names in each PDF/VCR data field, shall be equal for each PDF/VCR data record in a PDF/VCR data sequence. The set of field names shall contain no duplicates. The field values, i.e. the values in each PDF/VCR data field, may be different per PDF/VCR data record.

NOTE 1 As the names in the **GTS_Fields** array are PDF name objects, the names allowed in a PDF/VCR data sequence are restricted to that set.

NOTE 2 The PDF/VCR data sequence can contain fields not referenced by any name in the **GTS_Fields** array of the PDF/VCR template file.

NOTE 3 Different placeholders can reference the same name in the **GTS_Fields** array. Thereby, a PDF/VCR data field can be used for multiple replacements.

A PDF/VCR data sequence is defined to *match* a given PDF/VCR template file if each name in the **GTS_Fields** array in the template attribute of the PDF/VCR template file is matched by a field name in each PDF/VCR data record of the PDF/VCR data sequence as defined below.

A PDF/VCR data sequence may be obtained from

— a *static data source*: number and content of the records is known when the data sequence is provided;

— a *live data source*: number and content of the records is not fully known when the data sequence is provided.

NOTE 4 A live data source can be aggregated from a static data source and a live data source (with less fields).

Each value in a PDF/VCR data field shall be a byte sequence as specified below.

A PDF/VCR data sequence (obtained from a static data source) may be embodied as a CSV file with headers as specified in RFC 4180. Line separators, fields separators, quotes and escapes shall be applied as in RFC 4180:2005, Clause 2. The first line shall contain the field names corresponding to each column as headers.

The field names in the CSV file header line shall be encoded in UTF-8 as specified in RFC 3629.

The name of the i-th PDF/VCR data field of each PDF/VCR data record shall be the name in the i-th field (column) of the header line of the CSV file representing the PDF/VCR data sequence.

The value of the i-th PDF/VCR data field of a PDF/VCR data record shall be the value in the i-th field (column) of the CSV file record representing the PDF/VCR data record, after removing escapes.

A name of a PDF/VCR data field is defined to *match* a PDF name if the sequence of Unicode characters obtained for the PDF name is identical to the sequence of Unicode characters in the field name.

A sequence of bytes in a PDF name is converted to a sequence of Unicode characters by expanding # sequences if any, and interpreting the bytes according to UTF-8, as recommended in the applicable version of the PDF Reference.

NOTE 5 The interpretation of bytes according to UTF-8 is recommended in the PDF 1.6 Reference, 3.2.4.

Contrary to RFC 4180, allowed bytes in non-escaped TEXTDATA shall be all byte values from 0 to 255, except COMMA, CR, LF, DQUOTE, as defined in RFC 4180.

The line separator shall be CRLF. The field value separator shall be the ASCII COMMA character. Values may be enclosed in double quotes (DQUOTE, '"'). The double quote serves also as an escape character.

NOTE 6 Compliant with RFC 4180, the number of fields is identical in each record.

NOTE 7 An empty field means a content stream with no content. Substituting a placeholder object with an empty content stream will result in the sample content being removed.

A data sequence (obtained from a live data source) may be embodied as a stream of records as specified for a data sequence obtained from a static data source above.

8 PDF/VCR-1 conformance requirements

8.1 General

The *PDF/VCR-1* conformance level supports variable content substitution for PDF/VCR-1 template files where values obtained from a PDF/VCR-1 data sequence are passed through unchanged as substitution content to the merge/render engine.

8.2 PDF/VCR-1 template file conformance

A conforming *PDF/VCR-1 template file* shall conform to the requirements specified for PDF/VCR-1 template files in this subclause.

A PDF/VCR-1 conforming template file shall be a PDF/VCR conforming template file as set out in 7.2 where the value of the **pdfvcrid:GTS_PDFVCRVersion** property is *PDF/VCR-1*.

The **GTS_Generator** entry in each placeholder in a PDF/VCR-1 conforming template file shall take the value *PassThrough*, indicating pass through as the method to obtain substitution content.

The value of the **GTS_Data** entry in each placeholder in a PDF/VCR-1 conforming template file shall be a name object. The name shall be contained in the **GTS_Fields** array in the template attribute of the PDF/VCR-1 template file.

NOTE Different placeholders can have the same name as values of their **GTS_Data** field. Thereby, a PDF/VCR-1 data field can be used for multiple replacements.

The substitution content *obtained* for a placeholder for a given PDF/VCR-1 data record using the *PassThrough* generator shall be the value of the PDF/VCR-1 data field matching the placeholder as defined in 8.3.2.

An annotated example can be found in Annex A.

8.3 PDF/VCR-1 data sequence conformance

8.3.1 General

A *PDF/VCR-1 data sequence* shall be a sequence of PDF/VCR-1 data records. A *PDF/VCR-1 data record* shall be a set of PDF/VCR-1 data fields. A *PDF/VCR-1 data field* shall be a PDF/VCR data field (i.e. a name/value pair) where the value can be used as PDF/VCR-1 substitution content.

A conforming *PDF/VCR-1 data sequence* shall be a PDF/VCR data sequence as set out in 7.3 where each PDF/VCR data field in each PDF/VCR data record is a conforming PDF/VCR-1 data field as specified in 8.3.2.

A conforming PDF/VCR-1 data sequence is defined to *match* a conforming PDF/VCR-1 template file if it matches the template file as defined in 7.3, and if each placeholder in the template file has a matching DF/VCR-1 data field in each PDF/VCR-1 data record of the PDF/VCR-1 data sequence as defined in 8.3.2.

8.3.2 PDF/VCR-1 data field conformance

A conforming *PDF/VCR-1 data field* is a PDF/VCR data field as defined in 7.3 which conforms to the following requirement:

— The value of the pair after decoding (i.e. removing escapes of the CSV file format) shall be a valid substitution content for the placeholder object where it is substituted as set out in 7.2.9.

A conforming PDF/VCR-1 data field is defined to *match* a placeholder in a given PDF/VCR-1 template file if the name of the PDF/VCR-1 data field matches the name in the **GTS_Data** entry for the placeholder as defined in 7.3.

An annotated example can be found in Annex A.

8.4 PDF/VCR-1 writer conformance

A conforming *PDF/VCR-1 writer* is an application that is able to write conforming PDF/VCR-1 template files as specified in 8.2, for at least the PDF/X-4 conformance level as defined in ISO 15930-7.

Statements about the conformance of a PDF/VCR-1 writer shall include a statement regarding the supported PDF/X conformance level(s).

8.5 PDF/VCR-1 data provider conformance

A conforming *PDF/VCR-1 data provider* is an application that is able to provide conforming PDF/VCR-1 data sequences matching conforming PDF/VCR-1 template files as specified in 8.3, for at least the PDF/X-4 conformance level as defined in ISO 15930-7.

Statements about the conformance of a PDF/VCR-1 data provider shall include a statement regarding the supported PDF/X conformance level(s).

NOTE A PDF/VCR-1 conforming data provider can be the same application as the PDF/VCR-1 conforming writer.

8.6 PDF/VCR-1 reader conformance

A conforming *PDF/VCR-1 reader* is an application that is able to read and appropriately process conforming PDF/VCR-1 template files for at least the PDF/X-4 conformance level as defined in ISO 15930-7, and conforming PDF/VCR-1 data sequences matching these template files.

NOTE A conforming PDF/VCR-1 reader can, for example, preflight each PDF/VCR-1 data record with the PDF/VCR-1 template file.

Statements about the conformance of a PDF/VCR-1 reader shall include a statement regarding the supported PDF/X conformance level(s).

8.7 PDF/VCR-1 processor conformance

8.7.1 General

A conforming *PDF/VCR-1 processor* is an application that is able to read conforming PDF/VCR-1 template files and conforming PDF/VCR-1 data sequences matching these template files, merge the content with the template file, and output (e.g. render) the merged result as specified in 8.7.2, for at least the PDF/X-4 conformance level as defined in ISO 15930-7.

Statements about the conformance of a PDF/VCR-1 processor shall include a statement regarding the supported PDF/X conformance level(s).

NOTE This document defines neither a conforming PDF/VCR template file nor a conforming PDF/VCR processor because PDF/VCR is only a set of base requirements.

8.7.2 PDF/VCR-1 replacement

A conforming PDF/VCR-1 processor shall be able

— to read a PDF/VCR-1 template file, and

— upon receiving a PDF/VCR-1 data record,

  — to merge the content with the PDF/VCR-1 template file by substituting the marked content sequence or XObject stream of the placeholder object of each placeholder in the template file with the corresponding substitution content obtained from the PDF/VCR-1 data record, and

  — to output (e.g. render) the merged result.

A conforming PDF/VCR-1 processor shall take as input

— a PDF/VCR-1 template file as specified in 8.2, and

— a PDF/VCR-1 data sequence as specified in 8.3.

A conforming PDF/VCR-1 processor shall support receiving as a PDF/VCR-1 data sequence at least a CSV file as specified in 7.3.

NOTE 1 Other formats are at the discretion of the conforming processor.

NOTE 2 This document does not prescribe how to match a data source to a template file.

A conforming PDF/VCR-1 processor should support receiving a PDF/VCR-1 data sequence (from a live data source) as a stream transmitted via a TCP/IP connection.

NOTE 3 Other transmission modes are at the discretion of the conforming processor.

For a given PDF/VCR-1 template file and a given PDF/VCR-1 data sequence, a PDF/VCR-1 conforming processor shall output (e.g. render) a set of merged pages for each PDF/VCR-1 data record of the PDF/VCR-1 data sequence. The sets of merged pages should be output in the order in which the PDF/VCR-1 data records appear in the PDF/VCR-1 data sequence.

NOTE 4 The expected ordering of the sets of merged pages is the order in which the PDF/VCR-1 data records appear in the PDF/VCR-1 data sequence. However, certain use cases might require a different order.

The set of merged pages for a given PDF/VCR-1 template file and a given PDF/VCR-1 data record shall contain the merged pages obtained for selected pages of the template file as defined by the **GTS_Pages** entry.

If the **GTS_Pages** entry is present in the template attribute of the PDF/VCR-1 template file, then the selected pages shall be all pages listed in the value of the PDF/VCR-1 data field which is contained in the given PDF/VCR-1 data record and referenced by the **GTS_Pages** entry.

If the **GTS_Pages** entry is not present, then the selected pages shall be all pages in the template.

The merged pages within each set should be output in the order in which the selected pages appear in the PDF/VCR-1 template file.

NOTE 5 The expected ordering of the pages is the order in which the pages appear in the PDF/VCR-1 template file. However, certain use cases might require a different order.

Outputting a merged page shall have the same result as outputting (e.g. rendering) the corresponding page of the PDF/VCR-1 template file in which the sample content of each placeholder object in the page has been replaced (as defined in 7.2.8) by the substitution content obtained for the corresponding placeholder from the given PDF/VCR-1 data record.

NOTE 6 The specific kind of output (e.g. creating a PDF file, creating a bitmap file, creating and printing a bitmap file) is not defined by this document.

NOTE 7 The exact type and structure of the output is not defined by this document, for example, a conforming processor can output a sequence of separate PDF instance files, or one PDF file containing the pages of all instances, or a sequence of bitmap files.

Annex A
(informative)

Example

A.1 Template file

The following sample PDF code fragments show the essential elements of a (PDF/X-4-based) PDF/VCR-1 template file as shown in Figure A.1. The sample has been edited for human readability. The explanations in serif font and preceded by a percent sign are not part of the sample.

See also the separate files accompanying this document.

% The following is the XMP metadata for the sample.

```
<x:xmpmeta xmlns:x="adobe:ns:meta/" x:xmptk="Adobe XMP Core 5.1.0-jc003">
    <rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#">
        <rdf:Description rdf:about=""
                xmlns:dc="http://purl.org/dc/elements/1.1/"
                xmlns:pdf="http://ns.adobe.com/pdf/1.3/"
                xmlns:xmp="http://ns.adobe.com/xap/1.0/"
                xmlns:pdfuaid="http://www.aiim.org/pdfua/ns/id/"
                xmlns:pdfvcrid=                 % This entry identifies the PDF/VCR
                                                % namespace.
                    "http://www.npes.org/pdfvcr/ns/id/"
                xmlns:pdfxid=                   % This entry identifies the PDF/X
                                                % namespace.
                    "http://www.npes.org/pdfx/ns/id/"
                xmlns:xmpMM="http://ns.adobe.com/xap/1.0/mm/"
                dc:format="application/pdf"
                pdf:Producer=
                   "iTextÂ® 5.5.5 Â©2000-2014 iText Group NV (AGPL-version)"
                pdf:Trapped="False"
                xmp:CreatorTool="PDF/VCR-1 template generator by Teclyn BV"
                xmp:ModifyDate="2016-01-27T10:24:12-05:00"
                xmp:CreateDate="2016-01-27T10:24:12-05:00"
                xmp:MetadataDate="2016-01-27T10:24:12-05:00"
                pdfvcrid:GTS_PDFVCRVersion=     % This entry identifies the PDF/VCR version.
                   "PDF/VCR-1"
```

```
            pdfvcrid:GTS_PDFVCRModDate=      % This entry shows the PDF/VCR
              "2016-01-27T10:24:12-05:00"    % modification date.

            pdfxid:GTS_PDFXVersion=          % This entry identifies the PDF/X version.
               "PDF/X-4"

            xmpMM:RenditionClass="Default"
            xmpMM:VersionID="1"
            xmpMM:DocumentID="637bc861-97c4-4642-b28c-98a47f35dd03">
            <dc:title>
                <rdf:Alt>
                    <rdf:li xml:lang="x-default">PDF/VCR-1 template
                       </rdf:li>
                </rdf:Alt>
            </dc:title>
            <pdfuaid:part>1</pdfuaid:part>
        </rdf:Description>
    </rdf:RDF>
</x:xmpmeta>
```

```
2 0 obj                                  % This object is the root of the structure tree
    << /Type /StructTreeRoot             % (StructTreeRoot entry).

       /RoleMap                          % The root of the structure tree contains a role
       << /Section /Sect                 % map for own structure element types.
          /Para /P                       % Section, Para, and Placeholder are user defined
          /Placeholder /Span             % names which are mapped to predefined
       >>                                % structure element types.

       /K [3 0 R]                        % The root of the structure tree is the parent of
                                         % the replacement root structure element.
       /ParentTree 45 0 R
    >>
endobj
```

```
3 0 obj                                  % This object is the replacement root
    << /Type /StructElem                 % structure element.
       /S /Section
       /A                                % The replacement root has an attribute A ...
       <<
          /O /GTS_Template               % ... whose owner (O) is GTS_Template.
                                         % The attribute (A) is called the template attribute.
          /GTS_Fields                    % The template attribute contains an array
          [  /brand /name /usage         % GTS_Fields whose elements are the field names
                /doctor                  % expected in the data sequence.
             /date /RXNr /barcode /lot
             /pharmacy
          ]
       >>
       /K                                % The template attribute's K entry is an array
       [  4 0 R 14 0 R 17 0 R 19 0 R     % referring directly or indirectly to the
          21 0 R 23 0 R 24 0 R 26 0 R    % placeholders.
          28 0 R 30 0 R 31 0 R 32 0 R    % The array may contain also entries not
          33 0 R 34 0 R 36 0 R 37 0 R    % referring to a placeholder, but only to a
          39 0 R                         % static element.
       ]
       /P 2 0 R                          % The replacement root is a direct descendent
    >>                                   % of the root of the structure tree.
endobj


34 0 obj                                 % This object is one of the structure elements
    << /Type /StructElem                 % referenced in the K array of the replacement
                                         % root.
       /S /Para                          % The object represents a paragraph (Para)
       /A                                % within the section (Section) defined by the
                                         % replacement root.
       << /O /Layout                     % The object provides only layout information.
          /TextAlign /Start
       >>
```

```
        /K [35 0 R]                          % But its child is a placeholder.
        /P 3 0 R
    >>
endobj


35 0 obj                                     % This object is a placeholder within the
                                             % paragraph defined above.
    << /Pg 11 0 R
        /Type /StructElem                    % A placeholder is a structure element ...
        /S /Placeholder
        /A                                   % ... which contains an attribute A ...
        <<
            /O /GTS_Replacement              % ... whose owner (O) is GTS_Replacement.
            /GTS_Data /doctor                % The replacement attribute contains an entry
                                             % GTS_Data whose value is the field name in the
                                             % data sequence, ...
            /GTS_Generator /PassThrough      % ... an entry GTS_Generator whose value is
                                             % PassThrough, and ...
            /GTS_BBox [50 38 180 48]         % should contain an entry GTS_BBox which
                                             % defines the page area affected by the
                                             % placeholder's appearance.
        >>
        /K 13                                % The placeholder contains an entry K
                                             % which refers to a placeholder object.
                                             % The reference to the placeholder object is
                                             % its MCID.
        /P 34 0 R
    >>
endobj


% The following marked content element (/Placeholder ... BDC ... EMC) is a placeholder object.
/F2 10 Tf                                    % Context of the placeholder object.
```