



FORUM STANDAARDISATIE

Expert Recommendation

ISO 32000-1:2008, Part 1: PDF 1.7

Author(s)

J.P.C. Verhoosel, M. van Bekkum

Date

28 August 2009

Version

v1.0

Status

Final

Contents

Management summary	4
1. Expert recommendation objective	5
1.1 Background	5
1.2 Process	5
1.3 Composition of the expert group	6
1.4 Explanatory notes for PDF v1.7	7
2. Area of application and scope	8
2.1 Area of application	8
2.2 Scope	10
3. Evaluation of the standard based on the criteria	11
3.1 Openness	11
3.1.1 Approval and enforcement	11
3.1.2 Availability	11
3.1.3 Intellectual property	12
3.1.4 Reuse	13
3.2 Usability	
3.2.1 Maturity	13
3.2.2 Functionality	14
3.2.3 Rival Standards	15
3.3 Potential	15
3.3.1 Supplier independence	15
3.3.2 Interoperability	16
3.4 Impact	16
3.4.1 Business management	16
3.4.2 Information provision	17
3.4.3 Technological risks	17
3.4.4 Security and privacy	18
3.4.5 Migration	18

4. Recommendation to Forum and Board	19
4.1 Summary of evaluation criteria	19
4.2 Recommendation	20
5. References	21

Management summary

This report contains the PDF v1.7 expert group's recommendation to the Standardisation Forum and the Standardisation Board concerning inclusion of the PDF v1.7 standard in the list of open standards governed by the 'Comply or Explain' principle.

The expert group has come to the conclusion that PDF v1.7 can be included in the list of open standards.

The most important aspects of this recommendation are as follows:

- The PDF v1.7 standard meets the proposed criteria with respect to openness, workability, potential and impact.
- The expert group advises that the scope of PDF v1.7 – like PDF/A-1 – should match the scope of ODF: central government, provincial government, water boards and local government. In that case the scope would cover all organisations to which the 'Comply or Explain' principle applies: government organisations and institutions in the (semi-)public sector¹.
- The area of application proposed by the expert group is “exchange and publication of documents to which no or only limited revisions can be made, which contain information on origin of the document or feature richness,² and for which PDF/A-1 cannot be used as a standard.” This demarcation of the area of application closely matches the area of application of PDF/A-1 already included in the list of open standards.
- The impact of the standard is mainly in the area of document creation. Inclusion of the standard in the list in no way guarantees correct use of the standard. Organisations will have to draw up specific guidelines and agreements to ensure correct use and implementation of the standard, and correct creation of documents.

¹ As defined in the action plan *Nederland Open in Verbinding* (The Netherlands Open in Connection) [3].

² 'Feature rich' components are components, such as videos and music, that cannot be saved in PDF/A.

1. Expert recommendation objective

1.1 Background

On Monday, 17 September 2007, the State Secretary of Economic Affairs sent the action plan for open standards and open-source software to the Lower House. The purpose of the action plan is to make information provision more accessible to achieve independence from IT suppliers and enable innovation.

One aspect of the action plan is compiling a list of standards governed by the 'Comply or Explain' principle. The Standardisation Board decides which standards will be included in the list, based in part on an expert evaluation of the standard.

The experts are part of an expert group that evaluates the standard based on a number of criteria. These criteria – and their evaluation in the form of specific questions – are specified and discussed in this expert recommendation. The criteria are taken from the report *Open standaarden: het proces om te komen tot een lijst met open standaarden* (Open standards: process for defining a list of open standards), accepted by the Standardisation Board and available on the Standardisation Forum website.

The assignment of the expert group therefore included providing a recommendation on whether PDF v1.7 should be included in the list of open standards, with or without specific conditions.

1.2 Process

The following procedure was used to define this recommendation:

- The expert group started by individually scoring PDF v1.7 based on a questionnaire. This questionnaire contains the criteria described in the above-mentioned report. Based on the answers given, the chairman of the expert group identified the bottlenecks.
- Next, the expert group held a meeting on 20 August 2009 for a general discussion of the outcome and, in particular, the bottlenecks identified. During this meeting, the area of application and the scope were defined.

The findings of the expert group were included in this recommendation report by the chairman. A first draft version was sent to the members of the expert group with a request for response. The feedback received was incorporated in the report and the finalised report was submitted for the public consultation phase.

1.3 Composition of the expert group

Experts and other persons who are directly or indirectly involved with the standard due to their personal expertise or work at a particular organisation were invited to join the expert group. In addition, an independent chairman was appointed to lead the expert group and act as the responsible party for the final expert recommendation.

The chairman was Jack Verhoosel, a senior business consultant and manager of the Connected Business group at TNO Information and Communication Technology. In his role as a business consultant and project leader he has been involved in many standardisation processes in various sectors. In addition, he was chairman of the Content Search Profile v1.3 expert group for the list of open standards in 2009. The expert group's supervisor was TNO Information and Communication Technology consultant Michael van Bekkum.

The members of the expert group were:

- Gijs Leffelaar (National Library of the Netherlands)
- Wouter Kool (National Library of the Netherlands)
- Rob van Fucht (Elsevier)
- Colin van Oosterhout (Adobe)
- Ronald Kerpershoek (SABIC)
- Robert Gillesse (Digital Heritage Netherlands)
- Mies Langelaar (Rotterdam Municipal Archives)
- Jacques Bogaarts (Nationaal Archief)

1.4 Explanatory notes for PDF v1.7

This recommendation concerns the following standard:

ISO 32000-1:2008, Document management – Portable document format – Part 1: PDF 1.7, hereinafter: PDF v1.7 [2].

The PDF v1.7 standard is the latest version of the Portable Document Format (PDF). PDF was created in 1993 and has been accepted as a de facto standard for a number of years. On 1 July 2008, PDF was issued as an open standard by the International Organization for Standardization (ISO) as ISO/IEC 32000-1:2008. Prior to that date it had been a proprietary format of Adobe Systems³.

PDF v1.7 specifies a file format for rendering electronic documents. The point of departure for the standard is that users should have the option to exchange and view documents independently of the environment in which they were created, and the environment in which they are printed or viewed. Each PDF v1.7 document contains a complete description of the document, including text, font objects (embedded or with typeface description), pictures, audio, video, and 2D/3D graphics.

³ Published by Adobe at: http://www.adobe.com/devnet/pdf/pdf_reference_archive.html

2. Area of application and scope

Government organisations are expected to use the list of open standards during tendering procedures, according to the 'Comply or Explain' principle. Depending on the functionality to be acquired, a decision will be made as to which interfaces must be implemented, and which standards from the list should be applied to this end. For this purpose, the expert group evaluated in which cases the functionality of PDF v1.7 should be used (area of application) and which organisations should use PDF v1.7 (scope).

2.1 Area of application

The expert group considered the relationship between the areas of application for ODF, PDF/A-1 en PDF v1.7. This is important in particular because ODF and PDF/A-1 are already on the list of standards and a clear division of the areas of application of the various standards is required. Evaluation of the five distinguishable phases of the life cycle of a document⁴ has shown that PDF v1.7 can be positioned between ODF and PDF/A-1 with an overlap in the areas of collaboration, exchange, publishing and archiving. This has been visualised in **Figure 1**.



Figure 1 Areas of application of ODF, PDF/A-1 and PDF v1.7

Creëren = Creating

Samenwerken = Collaborating

⁴ Chapter 3 in *ODF BELEIDSOPTIES VOOR DE NEDERLANDSE OVERHEID - Een verkenning* (ODF POLICY OPTIONS FOR THE DUTCH GOVERNMENT – An investigation) (version 1.01, dated 02/07/2007)

Uitwisselen = Exchanging

Publiceren = Publishing

Archiveren = Archiving

In order to clarify the overlap in areas of application, the expert group recommends using the PDF v1.7 standard for the following applications:

1. Documents intended for limited revisions by means of annotations. Revisions must be added to the document as an additional layer, instead of the original content being changed. For documents that can be fully revised, ODF should be used.
2. Publication of documents that need to provide the possibility to add a digital signature. This allows unambiguous identification of the origin of the document. If a digital signature is not required in the document, PDF/A-1 should be used for publication.
3. Publication of 'feature-rich' documents, for instance (non-exhaustive):
 - CAD documents containing layers and dimension data.
 - 3D documents.
 - GEO documents that may contain data such as degrees of longitude or latitude.
 - Documents containing multimedia data (such as flash video or audio).
 - Documents that contain an XML schema and validations to serve as an electronic form.
 - PDF portfolios that may contain a collection of document formats in a PDF container.
 - Documents with attachments, such as an ODF document.

If these functions do not form an essential part of the document, PDF/A-1 should be used for publication.

4. Archiving of such 'feature-rich' documents. An important consequence of selecting PDF v1.7 is that a document published in PDF v1.7 cannot be archived simply by being converted to PDF/A-1. This will cause loss of content and functionality. If these functions do not form an essential part of the document, PDF/A-1 should be used for archiving.

The area of application proposed by the expert group is therefore

“exchange and publication of documents to which no or only limited revisions can be made, an integral part of which is information on origin or feature richness, and for which PDF/A-1 as a standard does not provide sufficient functionality.”

A last important consideration is that a new version of PDF/A, version PDF/A-2, is expected to be available by the end of 2010 or early in 2011. Extension of the functionality of this future standard is expected to affect the area of application of PDF v1.7. A new evaluation of the use and area of application of PDF v1.7 within the context of inclusion in the list of open standards will then be necessary.

2.2 Scope

The expert group advises that the scope of PDF v1.7 – like PDF/A-1 – should match the scope of ODF: central government, provincial government, water boards and local government. In that case the scope would cover all organisations to which the ‘Comply or Explain’ principle applies: government organisations and institutions in the (semi-)public sector⁵.

5 As defined in the action plan *Nederland Open in Verbinding* (The Netherlands Open in Connection) [3].

3. Evaluation of the standard based on the criteria

A number of criteria were used to decide whether PDF v1.7 should be included in the list of open standards. These criteria are described in the report *Open standaarden, het proces om te komen tot een lijst met open standaarden* (Open standards – the process for creating a list of open standards) [1] and can be found on the website www.open-standaarden.nl. In this chapter, the outcome of the evaluation is explained for each criterion. For the sake of completeness, the definition of each criterion has been included in *italics*.

3.1 Openness

3.1.1 Approval and enforcement

The standard has been approved and will be enforced by a non-profit organisation. Ongoing development is based on a decision-making procedure which is open to all stakeholders (consensus or decision by majority, etc.).

PDF v1.7 was ratified and published by the International Organization for Standardization (ISO) in 2008. Further development and maintenance of PDF v1.7 will be realised by ISO/TC 171/SC2 in line with ISO's regular procedures. These procedures ensure that decision-making is open to all parties.

3.1.2 Availability

The standard has been published and its specifications document is freely available or can be acquired at a nominal fee. Everybody must be able to copy and use the document and make it available for free, or at a nominal fee.

The standard has been published on the ISO website and can be obtained at a nominal fee⁶. In the Netherlands, the standard can also be obtained at a nominal fee⁷ from the *Netherlands* Standardisation Institute (NEN). Adobe has also made the specification available for free on its

⁶ At the time this document was written, the price on the ISO website was CHF 380

⁷ At the time this document was written the price on the NEN website was **€273.67**

website with a comment that, although the content is identical⁸, their version of the document is not an official ISO document.

3.1.3 *Intellectual property*

The intellectual property – with respect to any patents that may exist – of (parts) of the standard is irrevocably made available on a royalty-free basis.

Adobe owns the patent for part of the technology used in this standard⁹. However, in principle, a royalty-free license is issued to anybody who wants to implement the standard.

In the standard itself, ISO states, among other things, that¹⁰:

- Compliance with the standard may imply use of patents owned by Adobe.
- The owner of the patents (Adobe) has assured ISO that licence negotiations will take place under reasonable and non-discriminatory conditions.

Although, in theory, no guarantee can be provided with respect to possible patent claims (as discussed above), the expert group believes this criterion has been met sufficiently.

⁸ "By agreement with ISO, Adobe Systems Incorporated is allowed to offer this version of the ISO standard as a free PDF file on our web site. It is not an official ISO document but the technical content is identical including the section numbering and page numbering." http://www.adobe.com/devnet/pdf/pdf_reference.html

⁹ <http://www.adobe.com/pdf/pdfs/ISO32000-1PublicPatentLicense.pdf>

¹⁰ "The International Organization for Standardization draws attention to the fact that it is claimed that compliance with this document may involve the use of patents concerning the creation, modification, display and processing of PDF files which are owned by the following parties:

- Adobe Systems Incorporated, 345 Park Avenue, San Jose, California, 95110-2704, USA

ISO takes no position concerning the evidence, validity and scope of these patent rights.

The holders of these patent rights has assured the ISO that they are willing to negotiate licenses under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statements of the holders of these patent rights are registered with ISO. Information may be obtained from those parties listed above.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. ISO shall not be held responsible for identifying any or all such patent rights."

It is also possible to include content in a PDF v1.7 document that is not covered by the intellectual property rights of Adobe. For instance, copyrighted embedded fonts. For such content, an agreement with the owning party will be required in all cases.

3.1.4 *Reuse*

There are no restrictions with respect to reuse of the standard.

There are no additional requirements with respect to use of the standard. Although, in theory, no guarantee can be provided with respect to possible patent claims (as discussed above), since the introduction of the standard there have been no known cases where possible restrictions have caused conflicts with respect to use of the standard. There are, on the other hand, examples where reuse and extension of the standard have been included in a new standard¹¹.

The expert group therefore believes that there are no restrictions regarding reuse of the standard.

3.2 **Usability**

3.2.1 *Maturity*

The standard has sufficiently taken shape.

Yes, the standard has evolved into version 1.7, is based on the accepted de facto standards for PDF v1.0 (from 1993) to PDF v1.6 (from 2004), and is generally considered to be a complete and proven product. The expert group indicates that this makes the standard sufficiently mature. In this respect, the expert group has made the following comments:

- Some parts of the standard introduced in this version are relatively new and may require further development. However, these parts have been sufficiently developed and tested for use.
- The standard has become so extensive that it is perhaps over-developed. The standard is becoming 'top-heavy'.

Further development and maintenance of the standard are guaranteed.

¹¹ PAdES, the European standard for PDF Advanced Electronic Signatures ; ETSI TS 102-778.

Yes, the organisation maintaining the standard (ISO) has proved to be a stable organisation able to develop and maintain standards over a long period.

A method for assessing conformity with the standard is available.

Pre-flighting¹² tools may be used and a variety of validation commercial and open-source tools are available for determining whether the standard is being applied according to its scope. Assessment within specific business processes is also possible. The expert group has found that validation by means of such tools is not always completely objective. The expert group therefore considers this validation method not ideal but realistic, since this situation is preferable to no validation at all.

There is sufficient practical experience with use of the standard.

The expert group believes this is not yet the case. In general, significant practical experience has been acquired with use the versions this standard is based on (PDF versions 1.0 to 1.6). This practical experience does not specifically concern version 1.7, but the expert group indicates that this does not affect the maturity of the standard.

The standard currently has sufficient support from (multiple) market parties, which will also apply in the future.

At present, version 1.7 of the PDF standard is not yet supported by all market parties, but support is increasing rapidly. Because of the importance market parties attribute to this standard, the expert group expects no problems in this respect.

Expectations for future use of the standard are favourable.

Yes, the expert group expects that implementation of this standard will increase rapidly among all manner of market parties and organisations.

3.2.2 *Functionality*

The standard meets the functional requirements for use of the standard within the proposed area of application.

¹² Pre-flighting is a term from the printing industry, which is used to indicate the process for checking whether a digital file includes all the necessary components, is valid, correctly formatted and of the required type.

Within the proposed area of application, functionality has been selected which is already being applied in practical use of the standard. The expert group does not know of any obvious functions in the area of application that are not supported by the standard.

3.2.3 Standards

Are there any rival standards? If so, specify and indicate organisations using the rival standards? What are the advantages and disadvantages of this standard compared to the rival standards?

The expert group states that such standards exist, but that they are not real contenders for the following reasons:

- Competitors focusing on same area of application who are not included in the list of open standards only have a small market share. For instance, the Microsoft XPS standard.
- Competitors focusing on the same area of application offer a much smaller function range and cover only part of the proposed area of application. XPS is also an example in this area.
- There are competitors who do, in principle, (partially) focus on the same area of application as PDF v1.7, but are already included in the list of open standards. These standards are ODF and PDF/A-1. However, because of the restricted area of application of PDF v1.7, the areas of application tie in with one another. Therefore there is no competition in the specified area of application for PDF v1.7.

Consequently, the expert group believes there are no real rival standards for the proposed area of application.

3.3 Potential

3.3.1 Supplier independence

Inclusion of the standard in the list contributes to increased supplier independence.

The expert group has discussed the relationship between the PDF v1.7 standard and Adobe. Dependency between PDF and Adobe has diminished since PDF v1.7 became an open ISO standard. Consequently, the expert group believes that inclusion of PDF v1.7 in the list of standards will further enhance supplier independence.

3.3.2 Interoperability

Inclusion of the standard in the list contributes to increased interoperability.

The expert group believes that inclusion of the standard in the list contributes to increased interoperability. Collaborations between government and citizens/companies in particular will benefit from use of the standard, because citizens and businesses will be using only one document format for all communication from government organisations.

In this respect, the following comments must be made:

- Inclusion of the standard in the list in no way guarantees correct use of the standard. Because of the many possibilities of the PDF v1.7 standard, documents can be created in this format, which conform to the standard, but are nevertheless deficient in many other areas (accessibility, readability, etc.). Additional guidelines and rules are therefore required for correct use and implementation of the standard.
- Use of PDF may lead to a reduction in the application options or functionality of the source document, which could adversely affect interoperability. This is due to the fact that some technologies are not (fully) supported in PDF v1.7. Consequently, in specific application domains, such as use of CAD/CAM applications, it is advisable to use specific PDF profiles or the original formats (such as PDF/E).

3.4 Impact

3.4.1 Business management

Does implementation of the standard involve any risks in the area of business management?

Does implementation of the standard have any positive effects on business management?

After discussing the impact of mandatory use of PDF v1.7 for exchange and publication of documents, the expert group reached the conclusion that the impact will mainly be in the document creation process. This matches the conclusion of the PDF/A-1 expert group. Implementation of PDF v1.7 requires the author of a document to create a 'tidy' document. Documents must be well structured and metadata must be added correctly. The findings of the expert group show that in government organisations this is not always the case. As a result,

conversion of documents to PDF v1.7 will require an additional processing step. This calls for additional regulation of the document creation process (see also the comment under 3.3.2).

The expert group believes that drawing up guidelines for document creation and the use of PDF v1.7 could greatly aid the implementation of the PDF v1.7 standard.

3.4.2 *Information provision*

Does implementation of the standard involve any risks in the area of information provision?

Does implementation of the standard have any positive effects on information provision?

The expert group believes the standard does not pose any major risks in the area of information provision. For instance:

- PDF v1.7 offers advanced support for metadating/labelling to ensure accessibility for the visually impaired. If the source document is not neatly structured, accessibility may be reduced during conversion to PDF v1.7 (see section 3.4).
- There is a limited risk that PDF v1.7 functionality may not be able to be made accessible to the visually impaired in all cases.
- In some application domains there is also a risk of loss of details and functionality (see section 3.3.2).

On the other hand, information exchange will be improved as a result of clarity due to the use of a single standard.

3.4.3 *Technological risks*

Are there any technological risks involved in implementation of the standard?

Does implementation of the standard have any positive technological effects on information provision?

The expert group believes the standard does not pose any technological risks. Although use of PDF v1.7 requires storing a PDF version in addition to the format in which the document is created, the resulting increase in required storage space cannot be considered a risk. Also, in many cases the source document will only be converted to PDF at the moment of exchange and will only exist during the exchange (and will not be stored).

Another positive effect is the reduction of the number of storage formats for documents, which will make management easier.

3.4.4 *Security and privacy*

Does implementation of the standard involve any risks in the area of security or privacy?

Does implementation of the standard have any positive technological effects on security and privacy?

The expert group believes the standard does not pose any risks in the area of security or privacy. It considers the possibilities provided by PDF v1.7 for realising document security measures by means of passwords, digital signatures, encryption, DRM, etc. a positive effect.

The expert group has reached the conclusion that correct implementation of the standard is a requirement for use of security measures. That way, the risk of any security issues during implementation will be limited as much as possible.

3.4.5 *Migration*

Is migration to the standard easy?

The expert group believes migration within the application domain should be easy. A variety of software is available for performing the migration, also from other file formats, but use of the correct software is a requirement. Compliance with the standard is not always realised well. The transformation may also result in loss of quality compared to the source document.

Migration from PDF v1.7 to PDF/A-1 is inadvisable. In addition to the need for guidelines and rules for creating 'neat' documents (see section 3.4), the choice between PDF/A-1 or PDF v1.7 is also a consideration. An important consequence of the choice for PDF v1.7 is that a document published in PDF v1.7 cannot be archived by converting it to PDF/A-1. This would cause loss of content and functionality. The point of departure for selection of one of the two standards is that PDF/A-1 should be the document format unless the functionality as described in the area of application of PDF v1.7 (see section 0) is required in the document.

A new version of PDF/A is expected to be available by the end of 2010 or in early 2011: PDF/A-2. Extension of the functionality of this future standard will improve some aspects of migration from PDF v1.7 to PDF/A, but some problems will remain. The choice for PDF/A-2 or PDF v1.7 will therefore remain a consideration.

4. Recommendation to Forum and Board

4.1 Summary of evaluation criteria

In summary, the outcome of the evaluation of the criteria is as follows:

- *Openness*

The standard meets the criteria for openness. Strictly speaking, the condition of irrevocable royalty-free availability of all patents that may be involved is not met, because this is partly outside of the control of the managing organisation (ISO), as no guarantee can be given that there will never be an organisation putting forward a patent claim. This does, however, not hinder inclusion in the list, partly because the expert group is not aware of any instances in which restrictions have caused conflicts.

- *Workability*

PDF v1.7 is a fully developed standard for which broad acceptance is to be expected. Significant practical experience has been acquired with the PDF versions this standard is based on. PDF v1.7 meets the requirements with respect to the proposed area of application. There is no rival standard in this area of application that provides the same functionality and has reached the same level of maturity.

- *Potential*

PDF v1.7 offers sufficient potential in the area of improving interoperability. It also enhances supplier independence.

- *Impact*

The impact of PDF v1.7 is mainly in the document creation process. Implementation of PDF v1.7 requires the author of a document to create a 'tidy' document. Drawing up guidelines and regulations may, however, significantly contribute to enhanced implementation of the PDF v1.7 standard and may therefore improve business management, information provision and technology. PDF v1.7 also offers an extensive set of features for securing documents and safeguarding privacy.

4.2 Recommendation

The expert group advises the Board to include PDF v1.7 in the list of open standards without any conditions. The expert group does, however, specify two important aspects that require special attention:

- The impact of the standard is mainly in the document creation process. Inclusion of the standard in the list in no way guarantees correct use of the standard. Organisations will have to draw up specific guidelines and agreements to ensure correct use and implementation of the standard, and correct creation of documents.
- This demarcation of the area of application closely matches the area of application of PDF/A-1 already included in the list of open standards. A new version of PDF/A, version PDF/A-2, is expected by the end of 2010 or in early 2011. Extension of the functionality of this future standard will affect the area of application of PDF v1.7. A new evaluation of the use and area of application of PDF v1.7 within the context of inclusion in the list of open standards will then be necessary.

The above points for attention do not in any way impede inclusion in the list.

5. References

- [1] P.H. Minnecré and L. Korsten, *Open Standaarden, Het proces om te komen tot een lijst met open standaarden*, Verdonck, Klooster & Associates B.V., 2008.
- [2] ISO 32000-1:2008 - Document management -- Portable document format -- Part 1: PDF 1.7.
- [3] *Actieplan Nederland Open in Verbinding*, 's-Gravenhage: Ministry of Economic Affairs, 2007.