

The hyperxmp package*

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Abstract

`hyperxmp` makes it easy for an author to include XMP metadata in a PDF document produced by \LaTeX . `hyperxmp` integrates seamlessly with `hyperref` and requires virtually no modifications to a document that already specifies document metadata through `hyperref`'s mechanisms.

1 Introduction

Adobe Systems, Inc. has been promoting XMP [5]—eXtensible Metadata Platform—as a standard way to include metadata within a document. The idea behind XMP is that it is an XML-based description of various document attributes and is embedded as uncompressed, unencoded text within the document it describes. By storing the metadata this way it is independent of the document's file format. That is, regardless of whether a document is in PDF, JPEG, HTML, or any other format, it is trivial for a program (or human) to locate, extract, and—using any standard XML parser—process the embedded XMP metadata.

As of this writing there are few tools that actually do process XMP. However, it is easy to imagine future support existing in file browsers for displaying not only a document's filename but also its title, list of authors, description, and other metadata.

This is too abstract! Give me an example. Consider a \LaTeX document with three authors—Jack Napier, Edward Nigma, and Harvey Dent—named in the \LaTeX source in the usual way: “`\author{Jack Napier \and Edward Nigma \and Harvey Dent}`”. With `hyperxmp`, the generated PDF file will contain, among other information, the following stanza of XMP code embedded within it:

```
<dc:creator>
  <rdf:Seq>
    <rdf:li>Jack Napier</rdf:li>
    <rdf:li>Edward Nigma</rdf:li>
    <rdf:li>Harvey Dent</rdf:li>
  </rdf:Seq>
</dc:creator>
```

*This document corresponds to `hyperxmp` v5.12, dated 2023/09/10.

In the preceding code, the `dc` namespace refers to the [Dublin Core schema](#), a collection of metadata properties. The `dc:creator` property surrounds the list of authors. The `rdf` namespace is the [Resource Description Framework](#), which defines `rdf:Seq` as an ordered list of values. Each author is represented by an individual list item (`rdf:li`), making it easy for an XML parser to separate the authors' names.

Remember that XMP code is stored as *metadata*. It does not appear when viewing or printing the PDF file. Rather, it is intended to make it easy for computer applications to identify and categorize the document.

1.1 Supported metadata

hyperxmp knows how to embed all of the following types of metadata within a document:

- address of primary author (`lptc4xmpCore:CreatorContactInfo.CiAdrExtadr`, `lptc4xmpCore:CreatorContactInfo.CiAdrCity`, `lptc4xmpCore:CreatorContactInfo.CiAdrRegion`, `lptc4xmpCore:CreatorContactInfo.CiAdrPcode`, and `lptc4xmpCore:CreatorContactInfo.CiAdrCtry`)
- author(s) (`dc:creator`)
- base URL for relative references (`xmp:BaseURL`)
- book edition (`prism:bookEdition`)
- copyright (`dc:rights` and `xmpRights:Marked`)
- date (`dc:date`, `xmp:CreateDate`, `xmp:ModifyDate`, and `xmp:MetadataDate`)
- DOI (`prism:doi`)
- email address(es) of primary author (`lptc4xmpCore:CreatorContactInfo.CiEmailWork`)
- file format (`dc:format`)
- file name of main \LaTeX source file (`dc:source`)
- file size in bytes (`prism:byteCount`)
- ISBN (`prism:isbn`)
- ISSN—both print (`prism:issn`) and electronic (`prism:elssn`)
- issue number of parent publication (`prism:number`)
- journal article version (`jav:journal_article_version`)
- keywords (`pdf:Keywords` and `dc:subject`)
- language used (`dc:language`)
- license URL (`xmpRights:WebStatement`)
- metadata writer (`photoshop:CaptionWriter`)

- page count (prism:pageCount)
- page range(s) (prism:pageRange)
- PDF version (pdf:PDFVersion)
- PDF-generating tool (pdf:Producer and xmp:CreatorTool)
- PDF/A version and conformance level (pdfaid:part and pdfaid:conformance)
- PDF/UA version (pdfuaid:part)
- PDF/X standard compliance (pdfxid:GTS_PDFXVersion)
- position/title of primary author (photoshop:AuthorsPosition)
- publication name of parent publication (prism:publicationName)
- publisher of the document (dc:publisher)
- rendition variation of the document (xmpMM:RenditionClass)
- summary (dc:description)
- subtitle (prism:subtitle)
- telephone number(s) of primary author
(lptc4xmpCore:CreatorContactInfo.CiTelWork)
- title (dc:title)
- trapping of colors (pdf:trapped)
- type of document (dc:type)
- type of parent publication (prism:aggregationType)
- unique identifier for the document (dc:identifier)
- URL of the document (prism:url)
- URL(s) of the primary author (lptc4xmpCore:CreatorContactInfo.CiUrlWork)
- UUID for the document (xmpMM:DocumentID)
- UUID for the document instance (xmpMM:InstanceID)
- version identifier for the document (xmpMM:VersionID)
- volume number of parent publication (prism:volume)

More types of metadata may be added in a future release.

<pre> \Title{Baking through the ages} \Author{A. Baker\sep C. Kneader} \Language{en-GB} \Keywords{cookies\sep muffins\sep cakes} \Publisher{Baking International} </pre>	<pre> \hypersetup{% pdftitle={Baking through the ages}, pdfauthor={A. Baker, C. Kneader}, pdflang={en-GB}, pdfkeywords={cookies, muffins, cakes}, pdfpublisher={Baking International} } </pre>
(a) pdfx (separate .xmpdata file)	(b) hyperxmp (main document)

Figure 1: Comparison of pdfx and hyperxmp

1.2 Comparisons with similar packages

xmpincl In short, `xmpincl` is more flexible but `hyperxmp` is easier to use. With `xmpincl`, the author manually constructs a file of arbitrary XMP data and the package merely embeds it within the generated PDF file. With `hyperxmp`, the author specifies values for various predefined metadata types and the package formats those values as XMP and embeds the result within the generated PDF file.

`xmpincl` can embed XMP only when running under `pdfLATEX` and only when in PDF-generating mode. `hyperxmp` additionally works with a few other PDF-producing `LATEX` backends.

`hyperxmp` and `xmpincl` can complement each other. An author may want to use `hyperxmp` to produce a basic set of XMP code, then extract the XMP code from the PDF file with a text editor, augment the XMP code with any metadata not supported by `hyperxmp`, and use `xmpincl` to include the modified XMP code in the PDF file.

pdfx The main difference between `hyperxmp` and `pdfx` is that `hyperxmp` tries to integrate as seamlessly as possible into an existing document. It leverages `hyperref`'s `\hypersetup` command and many of `\hypersetup`'s options and defines its own options in a compatible manner. In contrast, `pdfx` requires the user to create a separate `\jobname.xmpdata` file containing `pdfx`-defined commands for each metadata element.

Figure 1 adapts an example appearing in the `pdfx` manual to `hyperxmp`. The two are comparable line-by-line in terms of how one specifies the title, author, document language, keywords, and publisher. However, `hyperxmp` implicitly writes a wealth of additional metadata into the XMP packet such as the document date, creation date, creator tool, file format, PDF version, and unique document and instance IDs. In fact, if a document omits all of the code shown in Figure 1(b), it will still store the `\title` and `\author` data in the XMP packet.

One can therefore summarize the difference between `hyperxmp` and `pdfx` as follows: `pdfx` requires the author to be fully explicit about the document's metadata while `hyperxmp` allows some metadata to be specified implicitly, automatically inferring it when possible. In general, `hyperxmp` tries to simplify the author's task as much as possible.

2 Usage

hyperxmp works by postprocessing some of the package options honored by hyperref. To use hyperxmp, merely put a `\usepackage{hyperxmp}` in your document's preamble. That line can appear anywhere *after* the `\usepackage{hyperref}` but *before* hyperref's PDF options are specified with `\hypersetup`. hyperxmp will construct its XMP data using the following hyperref options:

- baseurl
- pdfauthor
- pdfcreationdate
- pdfkeywords
- pdflang
- pdfmoddate
- pdfproducer
- pdfsubject
- pdftitle
- pdftrapped

hyperxmp instructs hyperref also to accept the following options, which have meaning only to hyperxmp:

- pdfaconformance
- pdfpart
- pdfauthortitle
- pdfbookedition
- pdfbytes
- pdfcaptionwriter
- pdfcontactaddress
- pdfcontactcity
- pdfcontactcountry
- pdfcontactemail
- pdfcontactphone
- pdfcontactpostcode
- pdfcontactregion
- pdfcontacturl
- pdfcopyright
- pdfdate
- pdfdocumentid
- pdfdoi
- pdfeissn
- pdfidentifier
- pdfinstanceid
- pdfisbn
- pdfissn
- pdfissuenum
- pdflicenseurl
- pdfmetadata
- pdfmetalang
- pdfnumpages
- pdfpagerange
- pdfpublication
- pdfpublisher
- pdfpubstatus
- pdfpubtype
- pdfrendition
- pdfsource
- pdfsubtitle
- pdftype
- pdfupart
- pdfurl
- pdfversionid
- pdfvolumenum
- pdfxstandard

2.1 Option descriptions

`pdftitle` The document title is specified as normal for hyperref with `pdftitle`, but see Note 7 on page 15 for instructions on how to specify a title in multiple languages. If `pdftitle` is not specified it will inherit its value from the document's `\title`. hyperxmp introduces a complementary `pdfsubtitle` option:

```
pdftitle={Frankenstein},
```

`pdfsubtitle={The Modern Prometheus},`

Unfortunately, the subtitle can appear in only one language. It assumed to be the same language as the document language (`pdflang`) but can be overridden by preceding the text with a bracketed ISO 639-1 two-letter language code and an optional ISO 3166-1 two-letter region code. See the example below for `pdfpublication`.

`pdfauthor` `hyperref`'s `pdfauthor` option specifies the document's author(s). See Note 4 on page 14 for a discussion of the correct syntax. If `pdfauthor` is not specified it will inherit its value from the document's `\author`. `pdfauthor` indicates the primary author's position or title. `pdfcaptionwriter` specifies the name of the person who added the metadata to the document.

The next eight items describe how to contact the person or institution responsible for the document (the "contact"). `pdfcontactaddress` is the contact's street address and can include the institution name if the contact is an institution; `pdfcontactcity` is the contact's city; `pdfcontactcountry` is the contact's country; `pdfcontactemail` is the contact's email address (or multiple, comma-separated email addresses); `pdfcontactphone` is the contact's telephone number (or multiple, comma-separated telephone numbers); `pdfcontactpostcode` is the contact's postal code; `pdfcontactregion` is the contact's state or province; and `pdfcontacturl` is the contact's URL (or multiple, comma-separated URLs).

`pdfcopyright` defines the copyright text, and `pdflicenseurl` identifies a URL that points to the document's license agreement.

`pdfmetalang` indicates the natural language in which certain metadata—specifically, the document's title, subject, and copyright statement—are written. The language should be specified using an IETF language tag [11], for example, "en" for English, "en-US" for specifically United States English, "de" for German, and so forth. If `pdfmetalang` is not specified, `hyperxmp` assumes the metadata language is the same as the document language (`hyperref`'s `pdflang` option). If neither `pdfmetalang` nor `pdflang` is specified, `hyperxmp` uses only "x-default" as the metadata language.

XMP can include a universally unique identifier (UUID) for each document and for each instance of a given document. By default, `hyperxmp` assigns a version 4 (i.e., pseudorandom) UUID [12] for each of these. However, a document can alternatively specify a particular document identifier using `pdfdocumentid` and (not normally recommended) a particular instance identifier using `pdfinstanceid`. These should be of the form `uuid:xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx`, where "x" is a lowercase hexadecimal number. For example, `uuid:53ab7f19-a48c-5177-8bb2-403ad907f632` is a valid argument to `pdfdocumentid` (or `pdfinstanceid`). See Leach, Mealling, and Salz's UUID specification document for details on how to produce the various forms of UUIDs [12]. A more freeform mechanism than `pdfinstanceid` for versioning documents is available via `pdfversionid`. The version specified by `pdfversionid` can be incremented as 1, 2, 3, ...; identified with a hierarchical numbering scheme (e.g., this document is versioned 5.12 to match the package version); or labeled using any other approach. One possibility is to use a revision number or commit hash from the version-control software maintaining the document. For example, the `\gitVer` macro from the `gitver` package is an expandable (see Note 8 on page 16) version of the current `Git` hash that can suitably be passed to `pdfversionid`. If not specified, `pdfversionid` defaults to 1.

`pdfisbn` Already-published documents can be identified in a number of ways. `pdfisbn`

<code>pdfissn</code>	specifies the ISBN. <code>pdfissn</code> refers to the ISSN of the <i>print</i> version of the document while <code>pdfeissn</code> refers to the ISSN of the <i>electronic</i> version of the document.
<code>pdfdoi</code>	specifies the DOI and should include only the DOI name without any URL prefix. For example, specify <code>pdfdoi={10.1145/3149526.3149532}</code> , <i>not</i> <code>pdfdoi={https://doi.org/10.1145/3149526.3149532}</code> .
<code>pdfurl</code>	points to the complete URL for the document. In contrast, <code>baseurl</code> points one level up and is used to resolve relative URLs.
<code>baseurl</code>	
<code>pdfidentifier</code>	<code>pdfidentifier</code> provides an alternative mechanism to uniquely identify a document. Its advantage relative to <code>pdfisbn</code> , <code>pdfissn</code> , <code>pdfdoi</code> , etc. is its flexibility; any of a wide variety of identification types can be used. ¹ <code>pdfidentifier</code> 's disadvantage is that it allows only a single identifier per document. For example, a document could use <code>pdfidentifier=urn:iso:std:32000:ed-1:v1:en</code> to identify itself as version 1 of English-language ISO standard 32000-1, but then this same document could not also use <code>pdfidentifier</code> to identify itself by DOI (<code>info:doi/...</code>), ISBN (<code>urn:ISSN:...</code>), etc. (It can still use the options described in the previous paragraph, though.) If <code>pdfidentifier</code> is not specified explicitly, <code>hyperxmp</code> will use the first non-empty value out of the DOI, electronic ISSN, print ISSN, and ISBN or skip the identifier entirely if all of those are empty.
<code>pdfpublication</code>	Already-published documents can further be identified by the publication in which they appear. <code>pdfpublication</code> specifies the title of the journal, magazine, or other parent document. The title language is assumed to be the same as the document language (<code>pdflang</code>) but can be overridden by preceding the text with a bracketed ISO 639-1 two-letter language code and an optional ISO 3166-1 two-letter region code. For example, <code>pdfpublication={[fr]Charlie Hedbo}</code> indicates a French-language title. Were the language or pronunciation differences significant, <code>fr-FR</code> would indicate specifically the French spoken in France, as opposed to that spoken in, say, Canada (<code>fr-CA</code>) or Belgium (<code>fr-BE</code>). The publisher itself can be named using <code>pdfpublisher</code> .
<code>pdfpublisher</code>	
<code>pdfpubtype</code>	<code>pdfpubtype</code> indicates the type of publication in which the document was published. This should be one of the PRISM aggregation types [9] such as <code>book</code> , <code>journal</code> , <code>magazine</code> , <code>manual</code> , <code>report</code> , or <code>whitepaper</code> .
<code>pdfvolumenum</code>	For publications in journals, magazines, and similar periodicals, a document can specify the volume number with <code>pdfvolumenum</code> and the issue number within the volume with <code>pdfissuenum</code> .
<code>pdfissuenum</code>	<code>pdfpagerange</code> indicates the page numbers at which the document appears within the publication. The intention is that this be a comma-separated list of dash-separated ranges, as in <code>pdfpagerange={1,4-5}</code> . See Note 9 on page 16 for advice on how to assign <code>pdfpagerange</code> semi-automatically. A journal article's publication status can be indicated with <code>pdfpubstatus</code> . This option expects to take one of the values listed in Table 1. See the NISO/ALPSP Journal Article Versions recommendation [1] for an explanation of each of those values and when to use them.
<code>pdfpagerange</code>	
<code>pdfpubstatus</code>	
<code>pdfbookedition</code>	For books, <code>pdfbookedition</code> names the edition of the book. This is specified as text, not a number. As with <code>pdfpublication</code> (above), <code>pdfbookedition</code> accepts a bracketed language code, as in <code>pdfbookedition={[en]Second edition}</code> .
<code>pdfdate</code>	XMP metadata can include a number of dates (in fact, timestamps, as they include both date and time components). <code>pdfdate</code> specifies the document date. It is analogous to the L ^A T _E X <code>\date</code> command, and, like <code>\date</code> , defaults to the date

¹See, for example, <https://www.iana.org/assignments/urn-namespaces/urn-namespaces.xhtml> for the `urn:` URI scheme and <http://info-uri.info/registry/> for the `info:` URI scheme.

Table 1: Valid arguments for `pdfpubstatus`

Value	Meaning
AO	Author’s Original
SMUR	Submitted Manuscript Under Review
AM	Accepted Manuscript
P	Proof
VoR	Version of Record
CVoR	Corrected Version of Record
EVoR	Enhanced Version of Record

the document was built. It must be specified in either XMP format [5] or PDF format [4]. XMP dates are written in the form `YYYY-MM-DDThh:mm:ss+TT:tt`.² A W3C recommendation [15] discusses this format in more detail, but as an example, 14 hours, 15 minutes, 9 seconds past midnight U.S. Mountain Daylight Time (UTC-6) on the 23rd day of September in the year 2014 should be written as `2014-09-23T14:15:09-06:00`. This can be truncated (with loss of information) to `2014-09-23T14:15:09`, `2014-09-23T14:15`, `2014-09-23`, `2014-09`, or `2014` but no other subsets. PDF dates are written in the form `D:YYYYMMDDhhmmss+TT’tt’`. The same date in the preceding example would be written as `D:20140923141509-06’00’` in PDF format.

The document’s creation date, modification date, and metadata date are normally set automatically, but `pdfcreationdate`, `pdfmoddate`, and `pdfmetadate` can be used to override the defaults. Like `pdfdate`, `pdfmetadate` can be specified in either XMP or PDF format. However, because `hyperref` defines `pdfcreationdate` and `pdfmoddate` and expects these to be written as PDF dates, `hyperxmp` concomitantly accepts these two dates only in PDF format as well. Note that it’s rare that a document would need to specify any of `pdfcreationdate`, `pdfmoddate`, or `pdfmetadate`.

`pdftype` describes the type of document being produced. This refers to “the nature or genre of the resource” [5] such as `poem`, `novel` or `working paper`, as opposed to the file format (always `application/pdf` when generated by `hyperxmp`). Although `pdftype` can be assigned an arbitrary piece of text, the XMP specification recommends selecting types from a “controlled vocabulary” such as the DCMI Type Vocabulary [6]. The DCMI Type Vocabulary currently consists of only `Collection`, `Dataset`, `Event`, `Image`, `InteractiveResource`, `MovingImage`, `PhysicalObject`, `Service`, `Software`, `Sound`, `StillImage`, and `Text`. `pdftype` defaults to `Text`, which refers to “books, letters, dissertations, poems, newspapers, articles, archives of mailing lists,” [6] and other forms of text—all things L^AT_EX is commonly used to typeset.

Sometimes a base document is rendered in different forms. `pdfrendition` indicates the particular rendition the current document instance represents. The value should come from the following controlled vocabulary [5]: `default`, `draft`, `low-res`, `proof`, `screen`, and `thumbnail`. `hyperxmp`’s default value is `default`, which indicates the master document, unless the `draft` option is passed to `\documentclass`, in which case `hyperxmp` defaults to `draft`.

`hyperxmp` honors `hyperref`’s `pdftrapped` option. A document can indicate whether

²Although allowed by XMP, `hyperxmp` does not currently accept fractions of a second in timestamps.

it employs **color trapping** by specifying `pdftrapped=True` or `pdftrapped=False`. (`pdftrapped=Unknown` is also allowed.)

`pdfapart` and `pdfaconformance`, are used in conjunction with `hyperref`'s `pdfa` option to claim a particular PDF/A standard by which the document abides. They default to `pdfapart=1` and `pdfaconformance=B`, indicating the PDF/A-1b standard. These can be changed (with caution) to assert that the document abides by a different standard (e.g., PDF/A-2u). A document that conforms to the PDF/UA standard can use `pdfuapart` to indicate the PDF/UA conformance level. For example, `pdfuapart=1` asserts that the document respects PDF/UA-1. `pdfxstandard` indicates the particular PDF/X standard by which the document abides. Unlike `pdfapart` and `pdfaconformance`, which accept a number and a letter, respectively, `pdfxstandard` expects a textual identification of a standard name. The following are the acceptable PDF/X standard names as of at the time of this writing.

- PDF/X-1a:2001
- PDF/X-1a:2003
- PDF/X-3:2002
- PDF/X-3:2003
- PDF/X-4
- PDF/X-4p
- PDF/X-5g
- PDF/X-5n
- PDF/X-5pg

For example, one can specify `pdfxstandard={PDF/X-4}` or `pdfxstandard={PDF/X-3:2003}`, but specifying `pdfxstandard={PDF/X-3}` will not pass PDF/X validation. Note that at the time of this writing the use of the PDF/X-4p, PDF/X-5n, and PDF/X-5pg standards has not been tested.

Rarely needed options

`pdfsource` `pdfsource` overrides the name of the \LaTeX source file. It defaults to `\jobname.tex` but can be replaced by any other string. If `pdfsource` is given an empty argument, no document source will be specified at all.

The number of pages in the published, print version of the document can be expressed with `pdfnumpages`. This is computed automatically when the document is built using either `pdf \LaTeX` or `Lua \LaTeX` .

`pdfbytes` The `pdfbytes` option expresses the document's file size in bytes. The intention is for this to be used to display an estimate of download time to a user or to serve as a quick check on whether a file was transmitted correctly between systems. `pdfbytes` is computed automatically by both `pdf \LaTeX` and `Lua \LaTeX` , using the file size from the previous build of the document.

It is usually more convenient to provide values for all of the options presented in this section using `hyperref`'s `\hypersetup` command than on the `\usepackage` command line. See [the hyperref manual](#) for more information.

2.2 A complete example

The following is a sample \LaTeX document that provides values for most of the metadata options that `hyperxmp` recognizes:

```
\documentclass{article}
\usepackage[utf8]{inputenc}
\usepackage[unicode]{hyperref}
\usepackage{hyperxmp}
```

```

\title{%
  On a heuristic viewpoint concerning the production and
  transformation of light}
\author{Albert Einstein}
\date{March 17, 1905}

\hypersetup{%
  pdftitle={%
    On a heuristic viewpoint concerning the production and
    transformation of light},
  pdfsubtitle={[en-US]Putting that bum Maxwell in his place},
  pdfauthor={Albert Einstein},
  pdfauthortitle={\xmpquote{Technical Assistant\xmpcomma\ Level III}},
  pdfdate={1905-03-17},
  pdfcopyright={Copyright (C) 1905, Albert Einstein},
  pdfsubject={photoelectric effect},
  pdfkeywords={energy quanta, Hertz effect, quantum physics},
  pdflicenseurl={http://creativecommons.org/licenses/by-nc-nd/3.0/},
  pdfcaptionwriter={Scott Pakin},
  pdfcontactaddress={Kramgasse 49},
  pdfcontactcity={Bern},
  pdfcontactpostcode={3011},
  pdfcontactcountry={Switzerland},
  pdfcontactphone={031 312 00 91},
  pdfcontactemail={aeinstein@ipi.ch},
  pdfcontacturl={%
    http://einstein.biz/,
    https://www.facebook.com/AlbertEinstein
  },
  pdfdocumentid={uuid:6d1ac9ec-4ff2-515a-954b-648eeb4853b0},
  pdfversionid={2.998e8},
  pdfpublication={[de]Annalen der Physik},
  pdfpublisher={Wiley-VCH},
  pdfpubtype={journal},
  pdfvolumenum={322},
  pdfissuenum={6},
  pdfpagerange={132-148},
  pdfissn={0003-3804},
  pdfeissn={1521-3889},
  pdfpubstatus={VoR},
  pdflang={en},
  pdfmetalang={en},
  pdfurl={http://www.physik.uni-augsburg.de/annalen/history/einstein-
papers/1905_17_132-148.pdf},
  pdfdoi={10.1002/andp.19053220607},
  pdfidentifier={info:lccn/50013519}
}
\XMLLangAlt{de}{pdftitle={Über einen die Erzeugung und Verwandlung des
  Lichtes betreffenden heuristischen Gesichtspunkt}}

\begin{document}
\maketitle
A profound formal difference exists between the theoretical
concepts that physicists have formed about gases and other

```

```
ponderable bodies, and Maxwell's theory of electromagnetic
processes in so-called empty space\dots
\end{document}
```

Compile the document to PDF using any of the following approaches:

- pdfL^AT_EX
- LuaL^AT_EX
- X_YL^AT_EX
- L^AT_EX + Dvipdfm
- L^AT_EX + Dvips + Ghostscript
- L^AT_EX + Dvips + Adobe Acrobat Distiller

The L^AT_EX + Dvips + Ghostscript path stores the XMP packet in a compressed stream, which implies that a PDF reader is needed to access it. Ideally, XMP metadata should be stored uncompressed so it can be extracted as ordinary text. Unfortunately, as of 2022-10-07, Ghostscript has no plans to support uncompressed metadata streams ([Ghostscript bug report #705962](#)). It is possible to leave *all* streams uncompressed by passing `-dCompressStreams=false` to Ghostscript (e.g., via the `ps2pdf` wrapper script), but this leads to larger file sizes.

Once the document is compiled, the resulting PDF file will contain an XMP packet that looks something like that shown in Appendix A. Figure 2 is a screenshot of the XMP metadata as it appears in Adobe Acrobat's "Advanced" metadata dialog box. Further clicking on the "Advanced" item within that dialog box displays all of the document's metadata sorted by schema as shown in Figure 3.

2.3 Usage notes

Note 1: Conflicting metadata in PDF/A documents A PDF file includes an Info dictionary containing Author, Title, Subject, and Keywords keys. The `hyperref` package's `pdfauthor`, `pdftitle`, `pdfsubject`, and `pdfkeywords` options assign values to those keys. The `hyperxmp` package additionally uses those options to assign values to various XMP metadata: `dc:creator`, `dc:title`, `dc:description`, and `pdf:Keywords`. The PDF/A specification indicates that values that appear in both the PDF Info dictionary and XMP packet must match. The problem is that in XMP, the author and keywords can be proper lists, as in

```
<dc:creator>
  <rdf:Seq>
    <rdf:li>Curly Howard</rdf:li>
    <rdf:li>Larry Fine</rdf:li>
    <rdf:li>Moe Howard</rdf:li>
  </rdf:Seq>
</dc:creator>
```

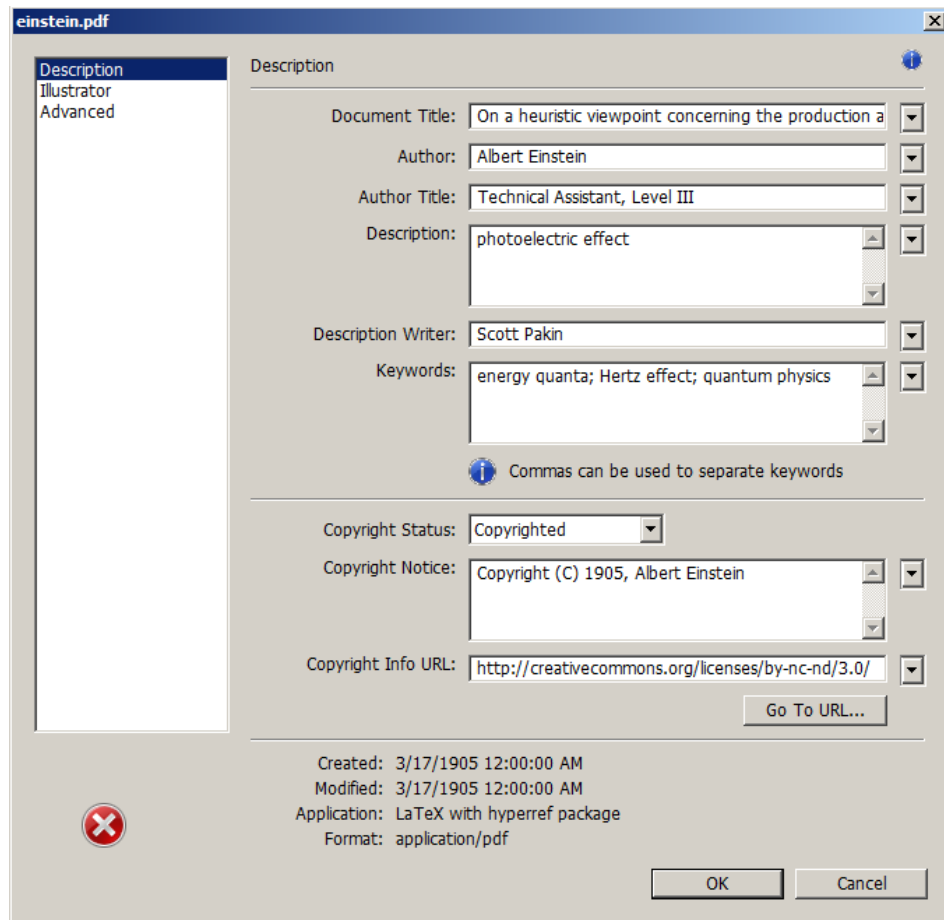


Figure 2: XMP metadata as it appears in Adobe Acrobat

while in PDF, the author and keywords are specified as flat strings. Alas, there is no definition of how a list should be collapsed to a flat string: “Curly Howard, Larry Fine, Moe Howard” or “Curly Howard; Larry Fine; Moe Howard” or something else. I have not yet found a form of flat string that passes all PDF/A validators. Furthermore, when Adobe Acrobat—at least Adobe Acrobat DC (2019) and earlier versions—converts a PDF file to PDF/A format, it does so by discarding all but the first author, which is an unsatisfying solution.

Starting with version 4.0, `hyperxmp`’s solution is to suppress writing metadata to the PDF Info dictionary and write it only to the XMP packet. (`hyperxmp` v5.0+ is more sophisticated. It suppresses only the author and keyword lists.) This appears to pacify PDF/A validators yet retains the author and keyword lists in their non-truncated form. If desired, the Info dictionary can be retained by passing the `keeppdfinfo` option to `\hypersetup`.

Note 2: Acrobat multiline-field bug The IPTC Photo Metadata schema states that “the [contact] address is a multiline field” [10]. `hyperxmp` converts commas in `pdfcontactaddress`’s argument to line breaks in the generated XML. Unfortunately, A

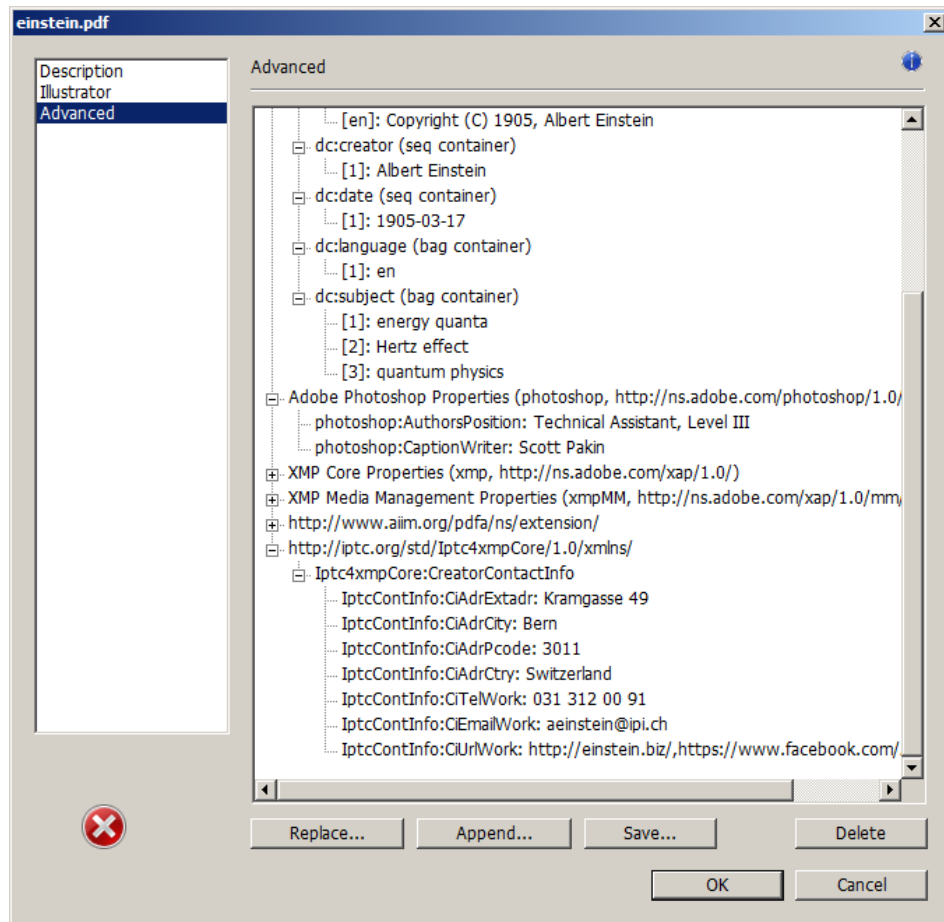


Figure 3: Additional XMP metadata as it appears in Adobe Acrobat

bug in Adobe Acrobat—at least in Adobe Acrobat DC (2019) and earlier versions—causes that PDF reader to discard line breaks in the contact address. Interestingly, Adobe Illustrator CS5 correctly displays the contact address. If you find Adobe Acrobat’s behavior bothersome, you can redefine the `\xmplinesep` macro as a string to use as an address-line separator. For example, the following replaces all commas appearing in `pdfcontactaddress`’s argument with semicolons:

```
\renewcommand*{\xmplinesep}{;}
```

Note 3: Object compression One intention of XMP is that metadata embedded in a file be readable even without knowledge of the file’s format. That is, the metadata are expected to appear as plain text. Although `hyperxmp` does its best to honor that intention, it faces a few challenges:

1. When run with versions of `LuaATEX` earlier than 0.85, `hyperxmp` leaves all PDF objects uncompressed. This is due to `LuaATEX` treating object compression

as a global parameter, unlike pdfL^AT_EX, which treats it as a local parameter. Hence, when hyperxmp requests that the XMP packet be left uncompressed, LuaL^AT_EX in fact leaves *all* PDF streams uncompressed. Beginning with version 3.0, hyperxmp includes a workaround that correctly leaves only the XMP metadata uncompressed, but this workaround is implemented only for LuaL^AT_EX v0.85 onwards.

2. X_YL^AT_EX (or, more precisely, the xdvipdfmx back end) exhibits the opposite problem. It compresses *all* PDF objects, including the ones containing XMP metadata. While Adobe Acrobat can still detect and utilize the XMP metadata, non-PDF-aware applications are unlikely to see the metadata. Three options to consider are to (1) use a different program (e.g., LuaL^AT_EX), (2) pass the `--output-driver="xdvipdfmx -z0"` option to X_YL^AT_EX to instruct xdvipdfmx to turn off all compression (which will of course make the PDF file substantially larger), or (3) postprocess the generated PDF file by loading it into the commercial version of Adobe Acrobat and re-saving it with the Save As... menu option.

Note 4: Literal commas hyperxmp splits the pdfauthor and pdfkeywords lists at commas. Therefore, when specifying pdfauthor and pdfkeywords, you should separate items with commas. Also, omit “and” and other text that does not belong to any list item. The following examples should serve as clarification:

Wrong: pdfauthor={Jack Napier, Edward Nigma, and Harvey Dent}

Wrong: pdfauthor={Jack Napier; Edward Nigma; Harvey Dent}

Right: pdfauthor={Jack Napier, Edward Nigma, Harvey Dent}

`\xmpcomma`
`\xmpquote` If you need to include a literal comma within an author or keyword list (where commas normally separate list items) or a street address (where commas normally separate lines), use the `\xmpcomma` macro to represent it, and wrap the entire entry containing the comma within `\xmpquote{...}` as shown below:

```
pdfauthor={\xmpquote{Jack Napier\xmpcomma\ Jr.},
           \xmpquote{Edward Nigma\xmpcomma\ PhD},
           \xmpquote{Harvey Dent\xmpcomma\ Esq.}}

pdfcontactaddress={Office of the President,
                   \xmpquote{Wayne Enterprises\xmpcomma\ Inc.},
                   One Wayne Blvd}
```

As of version 2.2 of hyperxmp, it is acceptable to use `\xmpcomma` and `\xmpquote` within any hyperxmp option, not just in those in which a comma normally serves as a separator (i.e., lists and multiline fields). Outside of cases in which a comma serves as a separator, `\xmpcomma` is treated as an ordinary comma, and `\xmpquote` returns its argument unmodified. Hence, it is legitimate to use `\xmpcomma` and `\xmpquote` in cases like the following

```
pdfauthortitle={\xmpquote{Psychiatrist\xmpcomma\ Arkham Asylum}}
```

(Like most `hyperxmp` options, `pdfauthor` inserts its argument unmodified in an XMP tag.) When in doubt, use `\xmpcomma` and `\xmpquote`; it should always be safe to do so.

`\xmptilde` Version 2.4 of `hyperxmp` introduces a convenience macro called `\xmptilde`. `\xmptilde` expands to a literal tilde character instead of the nonbreaking space that “~” normally represents. Use it to represent URLs such as `http://www.pakin.org/~scott/` (“`http://www.pakin.org/\xmptilde scott/`”) in options such as `baseurl`, `pdfcontacturl` and `pdflicenseurl`.

Note 5: Unicode support Unicode support is provided via the `hyperref` package. If you specify `unicode=true` either as a `hyperref` option or as an argument to the `\hypersetup` command, the document can include Unicode characters in its XMP fields.

Note 6: Automatically specified metadata `hyperxmp` attempts to identify certain metadata automatically. The hope is that in many cases, an author can simply include `\usepackage{hyperxmp}` in a document’s preamble and benefit from a modicum of XMP metadata with no additional effort.

Currently, `pdftitle` defaults to the document’s title as specified by `\title{...}`. `pdfauthor` defaults to the document’s author(s) as specified by `\author{...}`. `pdfdate` defaults to the current date and time. `pdfmetalang` defaults to the same value as `pdflang` if non-empty, “x-default” otherwise. `hyperxmp` recognizes some class-specific metadata as well, such as that provided via the Koma letter classes (e.g., `scrlettr2`) and the ACM article class (`acmart`).

If a document uses either the `babel` or `polyglossia` packages it is recommended that it *not* explicitly set `pdflang`. `pdflang` accepts only a single language name while `hyperxmp` can automatically query `babel` and `polyglossia` for a list of all languages used in the document and include this list in an XMP `dc:language` element.

`\XMPLangAlt` **Note 7: Multilingual metadata** The `pdfmetalang` option specifies the language in which the document’s metadata is written. It defaults to the value of `pdflang`, which specifies the document language. As of version 3.3 of `hyperxmp`, it is possible to include certain metadata—specifically, the document’s title, subject, and copyright statement—in more than one language. The `\XMPLangAlt` macro provides this functionality. Usage is as follows:

```
\XMPLangAlt {<language>} { <option>=<text>, ... }
```

where `<language>` is an ISO 639-1 two-letter country code with an optional ISO 3166-1 two-letter region code (e.g., “en” for English or “en-US” for specifically US English); `<option>` is one of “`pdftitle`”, “`pdfsubject`”, or “`pdfcopyright`”; and `<text>` is the text as expressed in the specified language. By way, of example, the following code provides the document title in English then specifies an alternative title to use in four other languages:

```
\hypersetup{%
  pdfmetalang={en},
  pdftitle={English title}
}
\XMPLangAlt{de}{pdftitle={Deutscher Titel}}
```

```

\XMPLangAlt{fr}{pdftitle={Titre fran\c{c}ais}}
\XMPLangAlt{it}{pdftitle={Titolo italiano}}
\XMPLangAlt{rm}{pdftitle={Titel rumantsch}}

```

Note 8: Expandable arguments All arguments passed to `hyperxmp` options must be expandable, in \TeX terminology. This implies that any macros that are used in arguments are limited to a relatively small set of operations (such as conditionals and macro expansion) and must produce a string of text. Code (such as macro definitions and arithmetic operations) will be written to XMP as code, not as the result of executing the code.

By way of example, the macros provided by the `texdate` package for typesetting dates are not expandable (at least at the time of this writing). Hence, the `\printfdate{Y}` in the following code snippet is not replaced by the current year, as one might expect:

```

\usepackage{texdate}
\initcurrdate
\hypersetup{%
  pdfcopyright={Copyright \textcopyright\ \printfdate{Y}, Scott Pakin}
}

```

Rather, it generates a `dc:rights` tag of the form “Copyright © =2=0=by-1by=02023, Scott Pakin”. The garbage in that line corresponds to the remnants of the `\printfdate` code after expanding all of the \TeX primitives and certain other control sequences it uses to the empty string. For example, “`\global\advance\texd@yr by-1`” expands to “`by-1`”.

It is not possible to determine a priori whether or not a macro is expandable. The best advice is to carefully inspect the XMP package in the output file to ensure that any macros used in arguments to `hyperxmp` options produced the expected output.

Note 9: Semi-automatic page ranges Although `pdfpagerange` is intended to refer to pages in the final, published version of a document, it would be convenient for them to be generated automatically when producing a standalone PDF file that is not intended to be incorporated into a book, journal, or other publication (or if it is known that the pages will not be renumbered for publication). One approach is to use the `totpages` package help generate `pdfpagerange`. For documents numbered from 1 to n , a simple

```

\hypersetup{%
  pdfpagerange={1-\ref*{TotPages}}
}

```

should suffice. A bit more effort is needed for documents that change numbering schemes, such as using lowercase Roman numerals for the front matter and Arabic numerals for the main matter and back matter. One approach is to use `\label` to mark the first and last page of each numbering scheme and specify `pdfpagerange` as in the following:


```

\hypersetup{%
  pdfpagerange={%
    \pageref*{page:begin-front}}-\pageref*{page:end-front},%
    1-\pageref*{TotPages}}%
}
}

```

I don't know how unnumbered pages (e.g., blank pages and the title page) are supposed to be handled. I suppose blank pages can be omitted from `pdfpagerange`, and the title page can be either omitted or listed as `title`, for example.

It appears that at least with version 2.00 of `totpages`, the `TotPages` label is not defined until after the `\begin{document}`. Consequently, using `TotPages` within a `\hypersetup` invocation in the document's preamble will produce “??” as the page count in the XMP packet. The solution is either to assign `pdfpagerange` after the `\begin{document}` or to ask L^AT_EX to do that on your behalf:

```

\AtBeginDocument{%
  \hypersetup{%
    pdfpagerange={1-\ref*{TotPages}}%
  }%
}

```

Note 10: Automatic computation of the PDF byte count The PRISM Basic Metadata schema [8] defines a `prism:byteCount` property that indicates the PDF file size in bytes. `hyperxmp` computes this value automatically when the document is built using LuaL^AT_EX but not when using any other T_EX engine. Note that `hyperxmp` uses the file size from the *previous* run of LuaL^AT_EX because the new PDF file is not yet complete. Consequently, one extra compilation is needed for the byte count to converge relative to the the number of compilations that would otherwise be required.

Starting with `hyperxmp` v5.9, the `hyperxmp` distribution includes a Perl script called `hyperxmp-add-bytecount` that edits a PDF file in place, adding or replacing the `prism:byteCount` property with one that specifies the final file size.³ Run the script as “`hyperxmp-add-bytecount <filename.pdf>`”.

The `latexmk` build tool can be configured to run `hyperxmp-add-bytecount` automatically every time a PDF file is generated. Simply add the code shown in Figure 4 to your `latexmk` configuration file. See [the latexmk manual](#) for information on configuration-file naming on different operating systems and explanations of the hook functions used in Figure 4.

Even though `hyperxmp` can compute the byte count automatically when run from LuaL^AT_EX, users of `latexmk` need to use configuration-file code like that shown in Figure 4. Otherwise, `latexmk` would compile the document one time too few for the byte count to converge. It is recommended that those who use both `latexmk` and `hyperxmp` configure `latexmk` to be `hyperxmp`-aware.

³The script was in fact introduced with `hyperxmp` v5.8 and was then called `add_byteCount`.

```

foreach my $cmd ( "latex", "lualatex", "pdflatex", "xelatex",
                  "dvipdf", "xdvipdfmx", "ps2pdf" ) {
    ${cmd} = "internal mycmd ${cmd}";
}

sub mycmd {
    my $retval = system @_;
    if ( $$Pdest =~ /\.pdf$/ ) {
        system 'hyperxmp-add-bytecount', $$Pdest;
    }
    return $retval;
}

```

Figure 4: latexmk configuration-file code for automatically invoking hyperxmp-add-bytecount every time a PDF file is generated

3 Implementation

This section presents the commented L^AT_EX source code for hyperxmp. Read this section only if you want to learn how hyperxmp is implemented.

One thing to bear in mind when reading the hyperxmp source code is that different actions occur at different times throughout document processing:

1. `\usepackage{hyperxmp}`: hyperxmp parses package options, defines a number of commands, loads various helper packages, and assigns default values to most XMP fields.
2. `\begin{document}`: hyperxmp loads certain packages such as hyperref and ifdraft and queries natural-language information from babel and polyglossia that becomes available only at the end of the preamble.
3. `\end{document}`: hyperxmp finalizes certain data that are known only at the end of the document, such as the page count, and writes the XMP packet to the PDF file.

3.1 Initial preparation

```

1 \IfDocumentMetadataTF{%
2   \PackageWarning
3     {hyperxmp}
4     {Disabling hyperxmp because it is incompatible with PDF management}
5 }{}
6 \IfDocumentMetadataTF{\endinput}{-}

```

`\hyxmp@dq@code` The ngerman package redefines “ ” as an active character, which causes problems for hyperxmp when it tries to use that character. We therefore save the double-quote character’s current category code in `\hyxmp@dq@code` and mark the character as category code 12 (“other”). The original category code is restored at the end of the package code (Section 3.8).

```

7 \edef\hyxmp@dq@code{\the\catcode'\}
8 \catcode'\=12

```

`\hyxmp@at@end` The `\hyxmp@at@end` macro includes code at the end of the document. When available (as is the case in most modern \TeX backends), `\AtEndDocument` works well enough. Otherwise, we invoke `\AtEndDvi` from the `atenddvi` package, which is robust but requires an additional \LaTeX run.

```

 9 \@ifundefined{AddToHook}{%
10  \@ifundefined{AtEndDocument}{%
11    \RequirePackage{atenddvi}
12    \let\hyxmp@at@end=\AtEndDvi
13  }{%
14    \let\hyxmp@at@end=\AtEndDocument
15  }
16 }{%
17  \def\hyxmp@at@end{\AddToHook{shipout/lastpage}}
18 }

```

`\hyxmp@set@jobname` Given an expanded `\jobname` followed by `\relax`, invoke the `\hyxmp@set@jobname@dbl` macro if the job name is surrounded by double quotes and the `\hyxmp@set@jobname@plain` macro otherwise.

```

19 \def\hyxmp@set@jobname#1\relax{%
20  \ifnextchar"{\hyxmp@set@jobname@dbl}{\hyxmp@set@jobname@plain}#1\relax
21 }

```

`\hyxmp@set@jobname@dbl` Set `\hyxmp@jobname` to to #1, discarding the surrounding double quotes.

```

\hyxmp@jobname 22 \def\hyxmp@set@jobname@dbl"#1"\relax{\xdef\hyxmp@jobname{#1}}

```

`\hyxmp@set@jobname@plain` Set `\hyxmp@jobname` to to #1.

```

\hyxmp@jobname 23 \def\hyxmp@set@jobname@plain#1\relax{\xdef\hyxmp@jobname{#1}}

```

Define `\hyxmp@jobname` as a sanitized version of `\jobname`. The problem with using `\jobname` directly is that it surrounds the filename with double quotes if it contains a space character. For example, a source file named `my-file.tex` results in a `\jobname` of “`my-file`”, but a source file named `my file.tex` results in a `\jobname` of “`"my file"`”. Trying to access “`my file`”.log (as is done on page 47) will fail because the filename does not in fact contain literal double quotes.

```

24 \expandafter\hyxmp@set@jobname\jobname\relax

```

`\hyxmp@aep@toks` In order for `hyperxmp` to be loaded safely during `\AtEndPreamble` we need to ensure that we perform no `\AtEndPreamble` actions until all top-level macro definitions have been made. The most straightforward approach would be to move all of `hyperxmp`’s `\AtEndPreamble` stanzas to the end of the package. However, this degrades readability of the source code. For instance, an `\AtEndPreamble` stanza related to integration with `hyperref` could no longer appear in the “Integration with `hyperref`” section (Section 3.2). Hence, we instead store in a token list, `\hyxmp@aep@toks`, each `\AtEndPreamble` stanza as we encounter it. This token list is evaluated as one of the package’s final actions (Section 3.8).

```

25 \newtoks{\hyxmp@aep@toks}

```

3.2 Integration with `hyperref`

An important design decision underlying `hyperxmp` is that the package should integrate seamlessly with `hyperref`. To that end, `hyperxmp` takes XMP metadata

from `hyperref`'s `baseurl`, `pdfauthor`, `pdfkeywords`, `pdflang`, `pdfproducer`, `pdfsubject`, `pdftrapped`, and `pdftitle` options. It also introduces a number of new options, which are listed on page 5. For consistency with `hyperref`'s document-metadata naming conventions (which are in turn based on L^AT_EX's document-metadata naming conventions), we do not prefix metadata-related macro names with our package-specific `\hyxmp@` prefix. That is, we use names like `\pdfcopyright` instead of `\hyxmp@pdfcopyright`.

We load a bunch of helper packages: `kvoptions` for package-option processing, `pdfescape` and `stringenc` for re-encoding Unicode strings, `intcalc` for performing integer calculations (division and modulo), `iftex` for determining which T_EX engine is being used, `ifmtarg` for testing if a macro argument is empty or all spaces, `etoolbox` for dynamically patching existing commands (specifically, `hyperref`'s `\PDF@FinishDoc`), and `ifthen` for convenient string comparisons.

```

26 \RequirePackage{kvoptions}
27 \RequirePackage{pdfescape}
28 \RequirePackage{stringenc}
29 \RequirePackage{intcalc}
30 \RequirePackage{iftex}
31 \RequirePackage{ifmtarg}
32 \RequirePackage{etoolbox}
33 \RequirePackage{ifthen}

```

There are a few places where `hyperxmp` can take advantage of LuaT_EX features. To simplify the use of LuaT_EX we load the `luacode` package.

```

34 \ifLuaTeX
35   \RequirePackage{luacode}
36 \fi

```

`\ifmtargexp` `\ifmtarg` and `\ifnotmtarg` do not expand their first argument. Define `\ifnotmtargexp` `\ifmtargexp` and `\ifnotmtargexp` as expanding versions of those macros.

```

37 \def\ifmtargexp#1{\expandafter\ifmtarg\expandafter{#1}}
38 \def\ifnotmtargexp#1{\expandafter\ifnotmtarg\expandafter{#1}}

```

`\if@def@and@nonempty` This macro combines `\ifundefined` and `\ifmtargexp`. If the macro named #1 is both defined and non-empty, evaluate #2. Otherwise, evaluate #3.

```

39 \newcommand*\if@def@and@nonempty}[3]{%
40   \ifundefined{#1}{#3}{%
41     \expandafter\ifmtargexp\expandafter{\csname#1\endcsname}{#3}{#2}%
42   }%
43 }

```

`\hyxmp@pdfstringdef` Because `hyperxmp` uses underscores to represent hard spaces, we need “_” to map initially to something other than an underscore, in particular the ASCII NAK (`^^U`) character. To accomplish this, we wrap `hyperref`'s `\pdfstringdef` macro with our own version that temporarily does the proper substitution. Later in the execution, after underscores have been replaced with spaces, we replace NAK characters with underscores.

```

44 \newcommand{\hyxmp@pdfstringdef}[2]{%
45   \let\hyxmp@textunderscore=\textunderscore
46   \let\textunderscore=\hyxmp@uscore
47   \pdfstringdef{#1}{#2}%

```

```

48 \let\textunderscore=\hymp@textunderscore
49 }

```

`\@pdfdatetime` Prepare to store the document’s date and (optionally) time. Whether specified by the author in XMP format or PDF format (see Section 3.4.2) we always store `\@pdfdatetime` as an XMP-format string.

```

50 \def\@pdfdatetime{}
51 \define@key{Hyp}{pdfdate}{%
52 \beginingroup
53 \Hy@unicodedefalse

```

`\next` Expand `pdfdate`’s argument and convert it to XMP format.

```

54 \edef\next{%
55 \noexpand\hymp@pdfstringdef\noexpand\@pdfdatetime{%
56 \noexpand\hymp@as@xmp@date{#1}}%
57 }%
58 \next
59 \endgroup
60 }

```

`\@pdfmetadatetime` Prepare to store the document’s metadata date and (optionally) time. Whether specified by the author in XMP format or PDF format (see Section 3.4.2) we always store `\@pdfmetadatetime` as an XMP-format string.

```

61 \def\@pdfmetadatetime{}
62 \define@key{Hyp}{pdfmetadate}{%
63 \beginingroup
64 \Hy@unicodedefalse

```

`\next` Expand `pdfmetadate`’s argument and convert it to XMP format.

```

65 \edef\next{%
66 \noexpand\hymp@pdfstringdef\noexpand\@pdfmetadatetime{%
67 \noexpand\hymp@as@xmp@date{#1}}%
68 }%
69 \next
70 \endgroup
71 }

```

`\@pdfcopyright` Prepare to store the document’s copyright statement.

```

72 \def\@pdfcopyright{}
73 \define@key{Hyp}{pdfcopyright}{\hymp@pdfstringdef\@pdfcopyright{#1}}

```

`\@pdftype` Prepare to store the document’s logical type, which defaults to “Text”.

```

74 \def\@pdftype{Text}
75 \define@key{Hyp}{pdftype}{\hymp@pdfstringdef\@pdftype{#1}}

```

`\@pdflicenseurl` Prepare to store the URL containing the document’s license agreement.

```

76 \def\@pdflicenseurl{}
77 \define@key{Hyp}{pdflicenseurl}{\hymp@pdfstringdef\@pdflicenseurl{#1}}

```

`\@pdfauthortitle` Prepare to store the author’s position/title (e.g., Staff Writer).

```

78 \def\@pdfauthortitle{}
79 \define@key{Hyp}{pdfauthortitle}{\hymp@pdfstringdef\@pdfauthortitle{#1}}

```

`\@pdfcaptionwriter` Prepare to store the name of the person who inserted the hyperxmp metadata.

```

80 \def\@pdfcaptionwriter{}
81 \define@key{Hyp}{pdfcaptionwriter}{\hyxmp@pdfstringdef\@pdfcaptionwriter{#1}}

```

`\@pdfmetalang` Prepare to store the natural language of the document’s metadata, typically as an ISO 639-1 two-letter abbreviation.

```

82 \def\@pdfmetalang{}
83 \define@key{Hyp}{pdfmetalang}{\hyxmp@pdfstringdef\@pdfmetalang{#1}}

```

`\hyxmp@no@bad@parts` Complain about a bad pdfapart or pdfuapart if given trailing non-digits after a part number.

```

84 \def\hyxmp@no@bad@parts#1\relax{%
85   \ifnotmtarg{#1}{%
86     \PackageWarning{hyperxmp}{pdfapart and pdfuapart must be numeric}%
87   }%
88 }

```

`\@hyxmp@count` Define a temporary counter. The code previously used `\@tempcnta`, but this is no longer safe within `\pdfstringdef` as of more recent versions of `hyperref`.

```

89 \newcount\@hyxmp@count

```

`\@pdfapart` Prepare to store the PDF/A part ID, which defaults to “1” if pdfa is passed to `hyperref`.

```

90 \def\@pdfapart{}
91 \define@key{Hyp}{pdfapart}{%
92   \afterassignment\hyxmp@no@bad@parts\@hyxmp@count=0#1\relax
93   \hyxmp@pdfstringdef\@pdfapart{\the\@hyxmp@count}%
94 }

```

`\@pdfaconformance` Prepare to store the PDF/A conformance ID, which defaults to “b” if pdfa is passed to `hyperref` and `\@pdfapart` is empty.

```

95 \def\@pdfaconformance{}
96 \define@key{Hyp}{pdfaconformance}{%
97   \uppercase{\hyxmp@pdfstringdef\@pdfaconformance{#1}}%
98 }

```

`\@pdfuapart` Prepare to store the PDF/UA part ID.

```

99 \def\@pdfuapart{}
100 \define@key{Hyp}{pdfuapart}{%
101   \afterassignment\hyxmp@no@bad@parts\@hyxmp@count=0#1\relax
102   \hyxmp@pdfstringdef\@pdfuapart{\the\@hyxmp@count}%
103 }

```

`\hyxmp@set@pdfx@major` Parse pdfxstandard as “PDF/X-*<major>**<other>*”, setting `\hyxmp@pdfx@major` to *<major>*.

```

104 \newcommand*{\hyxmp@set@pdfx@major}[1]{\hyxmp@set@pdfx@major@i#1!}

```

`\hyxmp@set@pdfx@major@i` This is the first helper macro for `\hyxmp@set@pdfx@major`. It stores the PDF/X major version in `\@hyxmp@count`.

```

105 \def\hyxmp@set@pdfx@major@i PDF/X-{%
106   \afterassignment\hyxmp@set@pdfx@major@ii
107   \@hyxmp@count=%
108 }

```

```

\hyxmp@set@pdfx@major@ii This is the second helper macro for \hyxmp@set@pdfx@major. It copies the PDF/X
\hyxmp@pdfx@major major version from \@hyxmp@count to \@hyxmp@pdfx@major and discards the rest
of the PDF/X standard string.
109 \def\hyxmp@set@pdfx@major@ii#1!{%
110 \edef\hyxmp@pdfx@major{\the\@hyxmp@count}%
111 }

\hyxmp@check@std Compare a user-provided string to a fixed string. (Assumption: Both are names of
PDF/X standard versions.) If they match, undefine \next, which we assume was
previously defined to issue an “unrecognized standard” warning message.
112 \newcommand*\hyxmp@check@std[2]{%
113 \ifthenelse{\equal{#1}{#2}}%
114 {\global\let\next=\relax}%
115 {}%
116 }%

\@pdfxstandard Prepare to store the PDF/X standard.
117 \def\@pdfxstandard{}
118 \def\hyxmp@pdfx@major{}
119 \define@key{Hyp}{pdfxstandard}{%
120 \hyxmp@pdfstringdef\@pdfxstandard{#1}%

\next Issue a warning message if the PDF/X standard named by the user does not appear
in a list of known PDF/X standards. This is to caution the user that hyperxmp
generates standard-specific XMP metadata and it can only guess at the correct
format for new standard versions. (See the comments on page 69 above the
definition of \hyxmp@pdfx@id@schema, for example.)
121 \gdef\next{%
122 \PackageWarning{hyperxmp}{Unrecognized PDF/X standard ‘#1’}%
123 }%
124 \hyxmp@check@std{#1}{PDF/X-1a:2001}%
125 \hyxmp@check@std{#1}{PDF/X-1a:2003}%
126 \hyxmp@check@std{#1}{PDF/X-3:2002}%
127 \hyxmp@check@std{#1}{PDF/X-3:2003}%
128 \hyxmp@check@std{#1}{PDF/X-4}%
129 \hyxmp@check@std{#1}{PDF/X-4p}%
130 \hyxmp@check@std{#1}{PDF/X-5g}%
131 \hyxmp@check@std{#1}{PDF/X-5n}%
132 \hyxmp@check@std{#1}{PDF/X-5pg}%
133 \next

\hyxmp@pdfx@major Parse the PDF/X major version number from pdfxstandard and assign it to
\hyxmp@pdfx@major.
134 \hyxmp@set@pdfx@major{#1}%
135 }

\@pdfsource Prepare to store the document’s source, which defaults to the value of \jobname.
136 \edef\@pdfsource{\hyxmp@jobname.tex}
137 \define@key{Hyp}{pdfsource}{\hyxmp@pdfstringdef\@pdfsource{#1}}

\hyxmp@DocumentID Prepare to store a UUID that represents the document.
138 \def\hyxmp@DocumentID{}
139 \define@key{Hyp}{pdfdocumentid}{\hyxmp@pdfstringdef\hyxmp@DocumentID{#1}}

```

`\hyxmp@InstanceID` Prepare to store a UUID that represents the current instance of the document.

```

140 \def\hyxmp@InstanceID{}
141 \define@key{Hyp}{pdfinstanceid}{\hyxmp@pdfstringdef\hyxmp@InstanceID{#1}}

```

`\@pdfversionid` Prepare to store a string that represents the current version of the document. It defaults to “1”.

```

142 \def\@pdfversionid{1}
143 \define@key{Hyp}{pdfversionid}{\hyxmp@pdfstringdef\@pdfversionid{#1}}

```

`\ifdraft` Use the `ifdraft` package to determine if this is a draft or final document. The `\next` challenge here is that we want to use `ifdraft` if it’s already loaded, load it if not, and not break any incompatible, author-defined `\ifdraft` macros that may occur either before or after the `\usepackage{hyperxmp}`. Our solution begins by defining a new group. Then, if `ifdraft` is not yet loaded, we locally undefine `\ifdraft` and load the package. In this case, we later “unload” the package by setting `\ver@ifdraft.sty` to `\relax`.

```

144 \begingroup
145 \@ifpackageloaded{ifdraft}{%
146 \let\next=\relax
147 }{%
148 \let\ifdraft=\relax
149 \RequirePackage{ifdraft}%
150 \def\next{%
151 \expandafter\global\expandafter\let\csname ver@ifdraft.sty\endcsname=\relax
152 }%
153 }%

```

`\@pdfrendition` Prepare to store a tag describing how this rendition of the document differs from the master. The default value is `default`, which indicates the master document, except in the case of `\documentclass[draft]`, for which `\@pdfrendition` defaults to `draft`.

```

154 \ifdraft{%
155 \gdef\@pdfrendition{draft}%
156 }{%
157 \gdef\@pdfrendition{default}%
158 }
159 \next
160 \endgroup
161 \define@key{Hyp}{pdfrendition}{\hyxmp@pdfstringdef\@pdfrendition{#1}}

```

`\@pdfpublication` Prepare to store the name of the publication in which the document was published.

```

162 \def\@pdfpublication{}
163 \define@key{Hyp}{pdfpublication}{\hyxmp@pdfstringdef\@pdfpublication{#1}}

```

`\@pdfpubtype` Prepare to store the type of the publication in which the document was published.

```

164 \def\@pdfpubtype{}
165 \define@key{Hyp}{pdfpubtype}{\hyxmp@pdfstringdef\@pdfpubtype{#1}}

```

`\@pdfbytes` Prepare to store the size of the file in bytes.

```

166 \def\@pdfbytes{}
167 \define@key{Hyp}{pdfbytes}{\hyxmp@pdfstringdef\@pdfbytes{#1}}

```


`\@pdfnumpages` Prepare to store the number of pages in the file.

```

168 \def\@pdfnumpages{}
169 \define@key{Hyp}{pdfnumpages}{\hyxmp@pdfstringdef\@pdfnumpages{#1}}

```

`\@pdfissn` Prepare to store the ISSN of the publication in which the document was published.

```

170 \def\@pdfissn{}
171 \define@key{Hyp}{pdfissn}{\hyxmp@pdfstringdef\@pdfissn{#1}}

```

`\@pdfeissn` Prepare to store the ISSN of the electronic version of the publication in which the document was published.

```

172 \def\@pdfeissn{}
173 \define@key{Hyp}{pdfeissn}{\hyxmp@pdfstringdef\@pdfeissn{#1}}

```

`\@pdfisbn` Prepare to store the ISBN of the publication in which the document was published.

```

174 \def\@pdfisbn{}
175 \define@key{Hyp}{pdfisbn}{\hyxmp@pdfstringdef\@pdfisbn{#1}}

```

`\@pdfbookedition` Prepare to store the edition of the book in which the document was published.

```

176 \def\@pdfbookedition{}
177 \define@key{Hyp}{pdfbookedition}{\hyxmp@pdfstringdef\@pdfbookedition{#1}}

```

`\@pdfpublisher` Prepare to store the name of the document's publisher.

```

178 \def\@pdfpublisher{}
179 \define@key{Hyp}{pdfpublisher}{\hyxmp@pdfstringdef\@pdfpublisher{#1}}

```

`\@pdfvolumenum` Prepare to store the volume identifier of the publication in which the document was published.

```

180 \def\@pdfvolumenum{}
181 \define@key{Hyp}{pdfvolumenum}{\hyxmp@pdfstringdef\@pdfvolumenum{#1}}

```

`\@pdfissuenum` Prepare to store the identifier of the issue within a volume of the publication in which the document was published.

```

182 \def\@pdfissuenum{}
183 \define@key{Hyp}{pdfissuenum}{\hyxmp@pdfstringdef\@pdfissuenum{#1}}

```

`\@pdfpagerange` Prepare to store the document's range of pages within the publication in which the document was published.

```

184 \def\@pdfpagerange{}
185 \define@key{Hyp}{pdfpagerange}{\hyxmp@pdfstringdef\@pdfpagerange{#1}}

```

`\@pdfdoi` Prepare to store a DOI that represents the current instance of the document.

```

186 \def\@pdfdoi{}
187 \define@key{Hyp}{pdfdoi}{\hyxmp@pdfstringdef\@pdfdoi{#1}}

```

`\@pdfurl` Prepare to store a URL that represents where the document can be found. Note that we do not prepend `baseurl` to the value provided.

```

188 \def\@pdfurl{}
189 \define@key{Hyp}{pdfurl}{\hyxmp@pdfstringdef\@pdfurl{#1}}

```

`\@pdfidentifier` Prepare to store an identifier that uniquely represents the document.

```

190 \def\@pdfidentifier{}
191 \define@key{Hyp}{pdfidentifier}{\hyxmp@pdfstringdef\@pdfidentifier{#1}}

```

`\@pdfsubtitle` Prepare to store the document's subtitle.

```
192 \def\@pdfsubtitle{}
193 \define@key{Hyp}{pdfsubtitle}{\hyxmp@pdfstringdef\@pdfsubtitle{#1}}
```

`\@pdfpubstatus` Prepare to store the document's journal article version.

```
194 \def\@pdfpubstatus{}
195 \define@key{Hyp}{pdfpubstatus}{\hyxmp@pdfstringdef\@pdfpubstatus{#1}}
```

The following eight macros—`\@pdfcontactaddress`, `\@pdfcontactcity`, `\@pdfcontactregion`, `\@pdfcontactpostcode`, `\@pdfcontactcountry`, `\@pdfcontactphone`, `\@pdfcontactemail`, and `\@pdfcontacturl`—together specify how to contact the person or institution responsible for the document.

`\@pdfcontactaddress` Prepare to store a street address for the document's contact person/institution. The IPTC standard defines this as follows:

The contact information address part. Comprises an optional company name and all required information to locate the building or postbox to which mail should be sent. To that end, the address is a multiline field.

For consistency with the rest of `hyperxmp`, we use commas to separate terms, in this case, lines of the address. The author can use `\xmpquote` and `\xmpcomma` to include literal commas.

```
196 \def\@pdfcontactaddress{}
197 \define@key{Hyp}{pdfcontactaddress}{%
198   \let\xmpcomma=\hyxmp@comma
199   \def\xmpquote##1{##1}%
200   \hyxmp@pdfstringdef\@pdfcontactaddress{#1}%
201   \def\xmpcomma{,}%
202   \let\xmpquote=\relax
203 }
```

`\@pdfcontactcity` Prepare to store the city of the document's contact person/institution.

```
204 \def\@pdfcontactcity{}
205 \define@key{Hyp}{pdfcontactcity}{\hyxmp@pdfstringdef\@pdfcontactcity{#1}}
```

`\@pdfcontactregion` Prepare to store the state or province of the document's contact person/institution.

```
206 \def\@pdfcontactregion{}
207 \define@key{Hyp}{pdfcontactregion}{\hyxmp@pdfstringdef\@pdfcontactregion{#1}}
```

`\@pdfcontactpostcode` Prepare to store the postal code of the document's contact person/institution.

```
208 \def\@pdfcontactpostcode{}
209 \define@key{Hyp}{pdfcontactpostcode}{\hyxmp@pdfstringdef\@pdfcontactpostcode{#1}}
```

`\@pdfcontactcountry` Prepare to store the country of the document's contact person/institution.

```
210 \def\@pdfcontactcountry{}
211 \define@key{Hyp}{pdfcontactcountry}{\hyxmp@pdfstringdef\@pdfcontactcountry{#1}}
```

`\@pdfcontactphone` Prepare to store the telephone number of the document's contact person/institution.

```
212 \def\@pdfcontactphone{}
213 \define@key{Hyp}{pdfcontactphone}{\hyxmp@pdfstringdef\@pdfcontactphone{#1}}
```

```

\@pdfcontactemail Prepare to store the email address of the document's contact person/institution.
214 \def\@pdfcontactemail{}
215 \define@key{Hyp}{pdfcontactemail}{\hyxmp@pdfstringdef\@pdfcontactemail{#1}}

\@pdfcontacturl Prepare to store the URL of the document's contact person/institution.
216 \def\@pdfcontacturl{}
217 \define@key{Hyp}{pdfcontacturl}{\hyxmp@pdfstringdef\@pdfcontacturl{#1}}

\hyxmp@no@info@lists Suppress hyperref from writing Author and Keywords into the Info dictionary. This
prevents conflicts between the PDF metadata and the XMP metadata that cause
PDF/A validation to fail. The PDF metadata can be restored by passing the
keeppdfinfo option to \hypersetup.
218 \def\hyxmp@no@info@lists{%

\hyxmp@suppress@pdf@info If \patchcmd fails for any reason—most likely, a modification to the hyperref
\next package—our fallback is to prevent hyperref from writing any data to the PDF Info
dictionary.
219 \def\hyxmp@suppress@pdf@info{%
220   \global\let\PDF@FinishDoc=\@empty
221   \PackageWarningNoLine{hyperxmp}{%
222     Suppressing the _entire_ PDF Info dictionary.\MessageBreak
223     Please notify the hyperxmp maintainer%
224   }%
225 }%
226 \let\next=\relax
227 \patchcmd
228   {\PDF@FinishDoc}%
229   {/Author(\@pdfauthor)}%
230   {}%
231   {}%
232   {\let\next=\hyxmp@suppress@pdf@info}%
233 \patchcmd
234   {\PDF@FinishDoc}%
235   {/Keywords(\@pdfkeywords)}%
236   {}%
237   {}%
238   {\let\next=\hyxmp@suppress@pdf@info}%
239 \next
240 }

241 \define@key{Hyp}{keeppdfinfo}[true]{%
242   \gdef\hyxmp@no@info@lists{}%
243 }

```

We need to capture list arguments (viz. `pdfauthor` and `pdfkeywords`) before `hyperref` converts them to `PDFDocEncoding`. Otherwise, `\xmpcomma` is permanently replaced with a comma, and we lose our ability to change it to a `\hyxmp@comma`. We therefore need to augment `hyperref`'s option processing with our own. Because `hyperref` has not yet been loaded we need to ensure that our augmentation gets loaded in the future: after the `\usepackage{hyperref}` but before options are passed to that package.

For lack of a better approach, `hyperxmp` redefines `\ProcessKeyvalOptions` to alter the way `hyperref` processes `pdfauthor` and `pdfkeywords`. This is somewhat

heavy-handed as it gets executed for *every* subsequently loaded package that uses `\ProcessKeyvalOptions`, but at least it does what we need. `hyperxmp` also redefines `\hypersetup` to do the same thing. This is required in case `hyperref` is loaded before `hyperxmp`.

New in v5.12 `hyperref` must be loaded *before* `hyperxmp`. This is because recent changes in `hyperref` and the L^AT_EX kernel prevent `hyperxmp` from hooking into `hyperref`'s internals if `hyperref` is loaded first.

```
244 \@ifpackageloaded{hyperref}{%
245 }{%
246   \PackageError{hyperxmp}%
247     {hyperref must be loaded before hyperxmp}%
248     {Recent versions of hyperref and the LaTeX kernel inhibit\MessageBreak
249       hyperxmp's ability to hook into hyperref's internals unless\MessageBreak
250       hyperref is loaded first.}
251 }
```

```
\hyxmp@pdfauthor Prepare to store the name of the author and a list of keywords.
\hyxmp@pdfkeywords 252 \def\hyxmp@pdfauthor{}
253 \def\hyxmp@pdfkeywords{}
```

```
\hyxmp@redefine@Hyp If not already redefined, redefine hyperref's pdfauthor and pdfkeywords options to
properly handle \xmpcomma and \xmpquote.
254 \newcommand*{\hyxmp@redefine@Hyp}{%
```

```
\hyxmp@Hyp@pdfauthor Store the old definition of \KV@Hyp@pdfauthor in \hyxmp@Hyp@pdfauthor, but
only if we see that \KV@Hyp@pdfauthor is defined and \hyxmp@Hyp@pdfauthor
isn't. Otherwise, we'd be defining \hyxmp@Hyp@pdfauthor in terms of itself and
creating an infinite loop.
255 \@ifundefined{KV@Hyp@pdfauthor}{}{%
256   \@ifundefined{hyxmp@Hyp@pdfauthor}{}%
257   \expandafter\let\expandafter\hyxmp@Hyp@pdfauthor
258   \csname KV@Hyp@pdfauthor\endcsname
259   }{}%
260   }%
```

```
\KV@Hyp@pdfauthor Redefine \KV@Hyp@pdfauthor to process its argument twice. The first time,
\xmpcomma \xmpcomma is defined as a placeholder character (\hyxmp@comma) and \xmpquote
\xmpquote as the identity function. The result is stored in \hyxmp@pdfauthor for use in
\hyxmp@and structured lists (those surrounding each entry with <rdf:li>). The second time,
\and \xmpcomma is defined as an ordinary comma, and \xmpquote is defined as a macro
\hyxmp@pdfauthor that puts its argument within double quotes. The result is stored in \@pdfauthor
\@pdfauthor for use in unstructured lists (those in which the entire list appears within a single
pair of tags). In case pdfauthor is left unspecified and we copy \author's argument
to pdfauthor, we temporarily redefine \and as the list separator when producing a
structured list and as "and" when producing an unstructured list.
261 \define@key{Hyp}{pdfauthor}{%
262   \let\xmpcomma=\hyxmp@comma
263   \def\xmpquote####1{####1}%
```

```

264 \let\hyxmp@and=\and
265 \def\and{,}%
266 \hyxmp@Hyp@pdfauthor{##1}%
267 \global\let\hyxmp@pdfauthor=\@pdfauthor
268 \def\and{and\space}%
269 \def\xmpcomma{,}%
270 \def\xmpquote####1{"####1"%
271 \hyxmp@Hyp@pdfauthor{##1}%
272 \def\xmpcomma{,}%
273 \let\xmpquote=\relax
274 \let\and=\hyxmp@and
275 }%

```

`\hyxmp@Hyp@pdfkeywords` The previous block of code now repeats for the keyword list, starting by storing the old definition of `\KV@Hyp@pdfkeywords` in `\hyxmp@Hyp@pdfkeywords`.

```

276 \ifundefined{KV@Hyp@pdfkeywords}{-}{%
277 \ifundefined{hyxmp@Hyp@pdfkeywords}{-%
278 \expandafter\let\expandafter\hyxmp@Hyp@pdfkeywords
279 \csname KV@Hyp@pdfkeywords\endcsname
280 }-}{%
281 }%

```

`\KV@Hyp@pdfkeywords` Redefine `\KV@Hyp@pdfkeywords` to process its argument twice. The first time, `\xmpcomma` `\xmpcomma` is defined as a placeholder character (`\hyxmp@comma`) and `\xmpquote` `\xmpquote` as the identity function. The result is stored in `\hyxmp@pdfkeywords` for use `\hyxmp@pdfkeywords` in structured lists (those surrounding each entry with `<rdf:li>`). The second `\@pdfkeywords` time, `\xmpcomma` is defined as an ordinary comma, and `\xmpquote` is defined as a macro that puts its argument within double quotes. The result is stored in `\@pdfkeywords` for use in unstructured lists (those in which the entire list appears within a single pair of tags).

```

282 \define@key{Hyp}{pdfkeywords}{-%
283 \let\xmpcomma=\hyxmp@comma
284 \def\xmpquote####1{"####1"%
285 \hyxmp@Hyp@pdfkeywords{##1}%
286 \global\let\hyxmp@pdfkeywords=\@pdfkeywords
287 \def\xmpcomma{,}%
288 \def\xmpquote####1{"####1"%
289 \hyxmp@Hyp@pdfkeywords{##1}%
290 \def\xmpcomma{,}%
291 \let\xmpquote=\relax
292 }%
293 }

```

`\hyxmp@ProcessKeyvalOptions` Redefine `kvoptions's \ProcessOptions` command to invoke `\hyxmp@redefine@Hyp` `\ProcessKeyvalOptions` before performing its normal option processing.

```

294 \let\hyxmp@ProcessKeyvalOptions=\ProcessKeyvalOptions
295 \renewcommand*{\ProcessKeyvalOptions}{-%
296 \global\let\ProcessKeyvalOptions=\hyxmp@ProcessKeyvalOptions
297 \hyxmp@redefine@Hyp
298 \hyxmp@ProcessKeyvalOptions
299 }

```

`\hyxmp@hypersetup` Redefine `hyperref`'s `\hypersetup` command to invoke `\hyxmp@redefine@Hyp` before performing its normal option processing.

```

300 \let\hyxmp@hypersetup=\hypersetup
301 \def\hypersetup{%
302   \hyxmp@redefine@Hyp
303   \hyxmp@hypersetup
304 }

```

`\hyxmp@concat@metadata` Assume that if the document loaded either `babel` or `polyglossia` it will eventually define one or more languages that `hyperxmp` can list within a `dc:language` element. As explained in Section 3.1, we defer the invocation of `\AtEndPreamble` to the end of the file.

```

305 \edef\hyxmp@concat@metadata{}
306 \expandafter\hyxmp@aep@toks\expandafter=\expandafter{%
307   \the\hyxmp@aep@toks
308   \AtEndPreamble{%
309     \@ifpackageloaded{babel}{%
310       \edef\hyxmp@concat@metadata{babel}%
311     }{%
312       \@ifpackageloaded{polyglossia}{%
313         \edef\hyxmp@concat@metadata{polyglossia}%
314       }{%
315         }%
316     }%
317 }%
318 }

```

`\hyxmp@warn@if@no@metadata` Issue a warning message if the author failed to specify any metadata at all. This excludes metadata that is included automatically such as the current timestamp. Note that we don't consider `\@pdfmetalang` as metadata as that value is meaningful only when used in conjunction with other information. We also don't examine `\@pdfapart` or `\@pdfaconformance` because those have nonempty default values.

```

319 \newcommand*{\hyxmp@warn@if@no@metadata}{%
320   \edef\hyxmp@concat@metadata{%
321     \hyxmp@concat@metadata
322     \@baseurl
323     \@pdfauthor
324     \@pdfauthortitle
325     \@pdfbookedition
326     \@pdfbytes
327     \@pdfcaptionwriter
328     \@pdfcontactaddress
329     \@pdfcontactcity
330     \@pdfcontactcountry
331     \@pdfcontactemail
332     \@pdfcontactphone
333     \@pdfcontactpostcode
334     \@pdfcontactregion
335     \@pdfcontacturl
336     \@pdfcopyright
337     \@pdfcreationdate
338     \@pdfdatetime
339     \@pdfdoi

```

```

340 \@pfeissn
341 \@pdfidentifier
342 \@pdfisbn
343 \@pdfissn
344 \@pdfissuenum
345 \@pdfkeywords
346 \@pdflang
347 \@pdflicenseurl
348 \@pdfmetadatetitle
349 \@pdfmoddate
350 \@pdfnumpages
351 \@pdfpagerange
352 \@pdfpublication
353 \@pdfpubtype
354 \@pdfsubject
355 \@pdfsubtitle
356 \@pdftitle
357 \@pdfuapart
358 \@pdfurl
359 \@pdfvolumenum
360 \@pdfxstandard
361 }%
362 \ifx\hyxmp@concat@metadata\@empty
363 \PackageWarningNoLine{hyperxmp}{%
364 \hyxmp@jobname.tex did not specify any metadata to\MessageBreak
365 include in the XMP packet.\space\space Please see the\MessageBreak
366 hyperxmp documentation for instructions on how to\MessageBreak
367 provide metadata values to hyperxmp}%
368 \fi
369 }

```

`\hyxmp@check@standards` Most PDF standards require that certain metadata be present. If compliance with a PDF standard is claimed but any of the metadata it requires are absent, issue a warning message.

```
370 \newcommand*\hyxmp@check@standards{%
```

If the `pdfa` option was passed to `hyperref` but `\@pdfapart` is not set, set it to 1 and `\@pdfaconformance` to B.

```

371 \ifHy@pdfa
372 \@ifmtargexp{\@pdfapart}{%
373 \PackageWarningNoLine{hyperxmp}{%
374 'pdfa' was passed to hyperref, but 'pdfapart' was\MessageBreak
375 not specified.\space\space Setting pdfapart to '1' and\MessageBreak
376 pdfaconformance to 'B'%
377 }%
378 \gdef\@pdfapart{1}%
379 \gdef\@pdfaconformance{B}%
380 }%
381 }%
382 \fi

```

`\hyxmp@standards` We define `\hyxmp@standards` to be non-empty if *any* PDF standard is claimed (currently, PDF/A, PDF/X, or PDF/UA).

```
383 \edef\hyxmp@standards{%
```

```

384 \pdfapart
385 \pdfxstandard
386 \pdfuapart
387 }%

```

Check that a document title was provided and is non-empty.

```

388 \ifnotmtargexp{\hyxmp@standards}{%
389 \ifmtargexp{\@pdftitle}{%
390 \PackageWarningNoLine{hyperxmp}{%
391 Missing pdftitle (required for PDF standards\MessageBreak
392 compliance)%
393 }%
394 }%
395 {}%
396 }%
397 }

```

`\hyxmp@aep@toks` Right before we reach the `\begin{document}` we check if `hyperref` was loaded. In normal usage, the document will already have done a `\usepackage{hyperref}` because otherwise, `\hypersetup` will not have been defined, and only a limited amount of metadata will be included. However, in case the author is relying exclusively on `hyperxmp`'s automatically detected metadata, we'll need to load `hyperref` now. As explained in Section 3.1, we defer the invocation of `\AtEndPreamble` to the end of the file.

```

398 \expandafter\hyxmp@aep@toks\expandafter=\expandafter{%
399 \the\hyxmp@aep@toks
400 \AtEndPreamble{%
401 \RequirePackage{hyperref}%

```

Older versions of `hyperref` write the Info dictionary to the PDF file at the end of the document. Newer versions of `hyperref` write the Info dictionary to the PDF file at the *beginning* of the document. For compatibility with both old and new `hyperref` implementations we suppress writing the Info dictionary here, at the beginning of the document.

```

402 \hyxmp@no@info@lists

```

If `pdftitle` is undefined but the author invoked `\title`, we copy the latter to the former. This addresses two problems: (1) handling L^AT_EX classes in which `\maketitle` clears `\title` and (2) ensuring that `hyperref` writes the same title to the PDF Info dictionary that `hyperxmp` writes to the XMP packet. We do likewise for `\author` → `pdfauthor`.

One tricky bit is that the standard L^AT_EX classes do not define `\@title` and `\@author` as empty strings but rather as calls to `\@latex@warning@no@line` that complain about a missing title/author. Hence, we can't simply test if the title and author are empty because they're not. Instead, we first locally redefine `\@latex@warning@no@line` to discard its argument then test if any text remains.

```

403 \begingroup
404 \let\@latex@warning@no@line=\@gobble
405 \hyxmp@use@first@valid{pdftitle}{\@pdftitle}{%
406 \scr@subject@var,%
407 \@title
408 }%
409 \hyxmp@use@first@valid{pdfauthor}{\@pdfauthor}{%

```



```

410     \scr@fromname@var,%
411     \@author
412   }%
413 \endgroup
414 }%
415 }

```

When we reach the `\end{document}` we need to gather up the metadata specified explicitly by the user, infer additional metadata where possible, and write the XMP packet to the PDF file.

```
416 \hyxmp@at@end{%
```

Fill in any missing metadata we can using values provided by the author via mechanisms other than the `\hypersetup` command.

```
417 \hyxmp@auto@assign@data
```

If the document claims to comply with one or more PDF standards, check that all of the requisite metadata are present.

```
418 \hyxmp@check@standards
```

We can finally construct the XMP packet and write it to the PDF document catalog.

```
419 \hyxmp@warn@if@no@metadata
420 \hyxmp@embed@packet
421 }

```

3.3 Advanced metadata detection

`hyperxmp` strives to be as convenient and user-friendly as possible. To that end, we try to automatically detect as much metadata as possible. The author can of course augment or override autodetected metadata by explicitly providing values to `\hypersetup`, but the hope is that we can save the author some effort in many cases.

In this section, we identify additional metadata we can use. Most of the functionality is class- or package-specific. For example, we check for phone numbers provided to the Koma letter classes via `\setkomavar{fromphone}{...}` and/or `\setkomavar{frommobilephone}{...}`, street addresses provided to the ACM article class via `\affiliation`, and languages the `polyglossia` package is instructed to load via `\setdefaultlanguage` and `\setotherlanguage`.

`\hyxmp@set@koma@phones` Define `\hyxmp@koma@phones` as a comma-separated list of the phone numbers provided to a Koma letter class (mobile and landline).

```

422 \newcommand*{\hyxmp@set@koma@phones}{%
423 \begingroup
424   \Hy@unicodedefalse
425   \@if@def@and@nonempty{scr@frommobilephone@var}{%
426     \@if@def@and@nonempty{scr@fromphone@var}{%
427       \hyxmp@pdfstringdef\hyxmp@koma@phones{\scr@frommobilephone@var,\scr@fromphone@var}%
428     }{%
429       \hyxmp@pdfstringdef\hyxmp@koma@phones{\scr@frommobilephone@var}%
430     }%
431   }{%
432     \@if@def@and@nonempty{scr@fromphone@var}{%
433       \hyxmp@pdfstringdef\hyxmp@koma@phones{\scr@fromphone@var}%

```

```

434     }{%
435     }%
436   }%
437   \endgroup
438 }

```

`\hyxmp@use@first@valid` Given a hyperxmp option (#1), its current value (#2), and a comma-separated list of option names (#3), if the current value is empty, invoke `\hypersetup` to set the option to the first non-empty item in the list. If all items in the list are empty, do nothing.

```

439 \newcommand*{\hyxmp@use@first@valid}[3]{%
440   \ifmtargexp{#2}{%
441     \hyxmp@use@first@valid@i{#1}#3,!,%
442   }%
443 }%
444 }

```

`\hyxmp@use@first@valid@i` This macro performs all the work for `\hyxmp@use@first@valid`. It loops over a comma-separated list of macros (#2), stopping when it encounters an end-of-list marker (“!”). The first list element that is neither undefined nor empty is assigned to a given option name (#1) using `\hypersetup`.

```

445 \def\hyxmp@use@first@valid@i#1#2,{%
446   \def\next{\hyxmp@use@first@valid@i{#1}}%
447   \ifx#2!%
448     \let\next=\relax
449   \else
450     \ifx#2\undefined
451     \else
452       \ifnotmtargexp{#2}{%
453         \hypersetup{#1={#2}}%
454         \def\next##1!,{}%
455       }%
456     \fi
457   \fi
458   \next
459 }

```

`\hyxmp@auto@assign@data` If certain metadata are unspecified, try to specify meaningful values using data provided by author via other means (e.g., `\title` for the document’s title).

```

460 \newcommand*{\hyxmp@auto@assign@data}{%

```

If `\@pdflang` is not set, see if we can detect the document language via either the `babel` or `polyglossia` packages.

```

461   \@if@def@and@nonempty{\@pdflang}{%
462     \let\hyxmp@dc@lang=\@pdflang
463   }{%
464     \hyxmp@detect@langs
465   }%

```

Replace an empty `\@pdfmetalang`. If `\@pdflang` is defined, use that as the metadata language. Otherwise, use x-default.

```

466   \ifx\@pdfmetalang\@empty
467     \ifx\@pdflang\@empty
468       \let\@pdfmetalang=\hyxmp@x@default

```

```

469   \else
470     \edef\@pdfmetalang{\@pdflang}%
471   \fi
472 \fi

```

Identify various author-provided information that can be co-opted for use as XMP metadata.

```

473 \hyxmp@use@first@valid{pdfcontactemail}{\@pdfcontactemail}{%
474   \scr@fromemail@var
475 }%
476 \hyxmp@set@koma@phones
477 \hyxmp@use@first@valid{pdfcontactphone}{\@pdfcontactphone}{%
478   \hyxmp@koma@phones
479 }%
480 \hyxmp@use@first@valid{pdfcontacturl}{\@pdfcontacturl}{%
481   \scr@fromurl@var
482 }%
483 \hyxmp@use@first@valid{pdfsubtitle}{\@pdfsubtitle}{%
484   \@subtitle
485 }%
486 \hyxmp@use@first@valid{pdfpublisher}{\@pdfpublisher}{%
487   \@publishers
488 }%

```

We handle the `acmart` class specially. `acmart` stores author-provided contact information in a structured format that we can process fairly easily. Note that if the author is not using the `acmart` class, `\hyxmp@parse@acmart` will have been redefined to do nothing.

```

489 \hyxmp@parse@acmart

```

Most PDF standards dictate that if the same metadata appear in both the XMP packet and the PDF Info dictionary, the metadata must match. This requirement poses a problem for a user-unspecified `pdfcreationdate` in the context of $\text{Xe}^{\text{L}}\text{A}^{\text{T}}\text{E}^{\text{X}}$. In this case we explicitly define `\@pdfcreationdate` as `\hyxmp@today@pdf` to prevent the `xdvipdfmx` back-end processor from detecting a missing `CreationDate` in the Info dictionary and adding its own—typically a few seconds after `hyperxmp` has constructed an `xmp:CreateDate` for the XMP metadata and leading to a metadata mismatch.

```

490 \@ifundefined{XeTeXversion}{}{%
491   \@ifmtargexp{\@pdfcreationdate}{%
492     \let\@pdfcreationdate=\hyxmp@today@pdf
493   }%
494   {}%
495 }%

```

Query the document currently being built for page and byte counts.

```

496 \hyxmp@query@self
497 }

```

Determine the size of the output file from the *previous* run of $\text{Lua}^{\text{L}}\text{A}^{\text{T}}\text{E}^{\text{X}}$. This action has to be performed before the `\begin{document}` because at that point the size of the output file is reset to zero. We use `\jobname.pdf` as the name of the output file because `status.output_file_name` is not defined at this point.

It's possible to use $\text{pdf}^{\text{L}}\text{A}^{\text{T}}\text{E}^{\text{X}}$'s `\pdffilesize` primitive to query the size of `\jobname.pdf` under $\text{pdf}^{\text{L}}\text{A}^{\text{T}}\text{E}^{\text{X}}$. Unfortunately, doing so has a side effect of making

latexmk view the PDF file as an input file, which puts latexmk in an infinite build loop. (This was the case for hyperxmp v5.5 and v5.6.) See the discussion at <https://github.com/borisveytsman/acmart/issues/413> for more information.

```
498 \ifLuaTeX
```

Now that we know we’re running Lua^AT_EX we define a Lua function, `get_pdf_size`, that takes the base name of the output file and returns the number of bytes in the corresponding PDF file. One difficulty is that, at the time of this writing, Lua^AT_EX lacks a mechanism for querying the full name of the output file. Our workaround is a tad kludgy but seems to work. We walk the list of command-line arguments for “`--output-directory=<dir>`”. (We in fact accept either one or two initial dashes and abbreviations as terse as “`-output-d`”.) Then, we concatenate the output directory (or “.” if unspecified), a path separator, the given base name of the job, and a “.pdf” extension. Alas, different operating systems use different path separators so we have to query the operating-system type to select an appropriate separator: “\” on Windows/DOS and “/” on everything else.

`get_pdf_size` is called regardless of whether we’re producing PDF or DVI output. We assume that even if the user specified `--output-format=dvi`, the user’s intention is eventually to convert the document to PDF.

```
499 \begin{luacode*}
500 function get_pdf_size (bname)
```

Search the list of command-line arguments for the output directory.

```
501   local odir = ""
502   for _, opt in ipairs(arg) do
503     local m = string.match(opt, "%-output%-d.-=(.*)")
504     if m then
505       odir = m
506     end
507   end
```

Set the path separator to either “/” or “\”, depending on the operating system.

```
508   local sep = "/"
509   if os.type == "windows" or os.type == "msdos" then
510     sep = "\\\"
511   end
```

Concatenate the output directory, path separator, base name, and .pdf extension. Do not insert a path separator if either (1) no output directory was specified, (2) the output directory already ends with the path separator, or (3) the output directory ends in a colon (and is therefore a relative directory) on Windows/DOS. As a few examples,

- “” + “/” + “myfile” + “.pdf” = “myfile.pdf”
- “/docs” + “/” + “myfile” + “.pdf” = “/docs/myfile.pdf”
- “/docs/” + “/” + “myfile” + “.pdf” = “/docs/myfile.pdf”
- “C:\docs” + “\” + “myfile” + “.pdf” = “C:\docs\myfile.pdf”
- “C:\docs\” + “\” + “myfile” + “.pdf” = “C:\docs\myfile.pdf”
- “C:\” + “\” + “myfile” + “.pdf” = “C:\myfile.pdf”
- “C:” + “\” + “myfile” + “.pdf” = “C:myfile.pdf”

```
512   local dlast = string.sub(odir, -1)
```

```

513   if odir == "" or dlast == sep or (dlast == ":" and sep == "\\") then
514       sep = ""
515   end
516   local fname = odir .. sep .. bname .. ".pdf"

```

Query the file size and return it.

```

517   local nbytes = lfs.attributes(fname, "size")
518   return nbytes
519 end
520 \end{luacode*}

```

Now that we've defined `get_pdf_size` we invoke it, passing it `\hyxmp@jobname` as the base name of the job. (Recall that `\hyxmp@jobname` is the same as `\jobname` but with any surrounding double quotes removed.) We store `get_pdf_size`'s output—which will be empty if the PDF file doesn't yet exist—in `\hyxmp@prev@pdf@size`.

```

521 \xdef\hyxmp@prev@pdf@size{%
522   \luadirect{
523     nbytes = get_pdf_size("\hyxmp@jobname")
524     if nbytes then
525       tex.write(nbytes)
526     end
527   }%
528 }%
529 \fi

```

`\hyxmp@query@self` Query the document currently being built to acquire page and byte counts.

```

530 \newcommand*{\hyxmp@query@self}{%

```

L^AT_EX's `totalpages` counter tracks the number of pages written. We use this mechanism to assign `\@pdfnumpages`.

```

531 \if@def@and@nonempty{@pdfnumpages}{%
532 }{%
533   \xdef\@pdfnumpages{\thetotalpages}%
534 }%

```

If `pdfbytes` hasn't been set, set it to the output file's size from the previous run.

```

535 \hyxmp@use@first@valid{pdfbytes}{\@pdfbytes}{%
536   \hyxmp@prev@pdf@size
537 }%
538 }

```

`\hyxmp@parse@acmart` The `acmart` class stores a rich set of author metadata in its `\addresses` macro. `\hyxmp@parse@acmart` extracts the contact information for the first author and converts that to XMP metadata.

```

539 \newcommand*{\hyxmp@parse@acmart}{%
540   \begingroup

```

`\@author` `acmart` has already invoked `\hypersetup{pdfauthor=...}` to specify the complete list of authors. At this point, `\@author` is defined to produce a warning message. We locally redefine it to do nothing.

```

541   \let\@author=\gobble

```

`\email` Within `\addresses`, `\email` is defined to accept two arguments, the second of `\hyxmp@address@val` which is the author's email address.

```

542     \def\email##1##2{%
543         \def\hyxmp@address@val{##2}%
544         \hyxmp@use@first@valid{pdfcontactemail}{\@pdfcontactemail}{%
545             \hyxmp@address@val
546         }%
547     }%

```

`\streetaddress` `\streetaddress` wraps the author's street address.

```

\hyxmp@address@val 548     \def\streetaddress##1{%
549         \def\hyxmp@address@val{##1}%
550         \hyxmp@use@first@valid{pdfcontactaddress}{\@pdfcontactaddress}{%
551             \hyxmp@address@val
552         }%
553     }%

```

`\city` `\city` wraps the author's city name.

```

\hyxmp@address@val 554     \def\city##1{%
555         \def\hyxmp@address@val{##1}%
556         \hyxmp@use@first@valid{pdfcontactcity}{\@pdfcontactcity}{%
557             \hyxmp@address@val
558         }%
559     }%

```

`\state` `\state` wraps the author's state or region name.

```

\hyxmp@address@val 560     \def\state##1{%
561         \def\hyxmp@address@val{##1}%
562         \hyxmp@use@first@valid{pdfcontactregion}{\@pdfcontactregion}{%
563             \hyxmp@address@val
564         }%
565     }%

```

`\country` `\country` wraps the author's country name.

```

\hyxmp@address@val 566     \def\country##1{%
567         \def\hyxmp@address@val{##1}%
568         \hyxmp@use@first@valid{pdfcontactcountry}{\@pdfcontactcountry}{%
569             \hyxmp@address@val
570         }%
571     }%

```

`\postcode` `\postcode` wraps the author's postal code.

```

\hyxmp@address@val 572     \def\postcode##1{%
573         \def\hyxmp@address@val{##1}%
574         \hyxmp@use@first@valid{pdfcontactpostcode}{\@pdfcontactpostcode}{%
575             \hyxmp@address@val
576         }%
577     }%

```

`\affiliation` We want to produce XMP metadata for only a single affiliation. Although `\hyxmp@use@first@valid` will ensure that only the first email, city, country, etc. encountered is considered, we run the first of one affiliation defining, say, a city and state but no country and a subsequent affiliation defining a country. In that case, the XMP would include the first author's city and state and the subsequent

author’s country. Hence, we define `\affiliation` to “self destruct” after its first use, discarding all further affiliations.

```
578 \def\affiliation##1##2{%
579     ##2%
580     \let\affiliation=\gobbletwo
581 }
```

We want to evaluate `\addresses` with the preceding local definitions in effect, but we don’t want to typeset any text appearing in the string. Hence, we “typeset” `\addresses` within a box that is subsequently discarded.

```
582 \setbox0=\hbox{\addresses}%
583 \endgroup
```

`acmart` supports other relevant metadata in addition to the authors’ mailing addresses. For instance, papers accepted for publication indicate their DOI number. However, papers under review will contain either a placeholder DOI, “10.1145/nnnnnnn.nnnnnnn”, or the example DOI specified in the `acmart` example document, “10.1145/1122445.1122456”. We ignore both of those DOIs.

```
584 \if@def@and@nonempty{@acmDOI}{%
585     \IfSubStr{\@acmDOI}{10.1145/1122445.1122456}{-}{%
586         \IfSubStr{\@acmDOI}{10.1145/nnnnnnn.nnnnnnn}{-}{%
587             \hyxmp@use@first@valid{pdfdoi}{\@pdfdoi}{%
588                 \@acmDOI
589             }%
590         }%
591     }%
592 }%
593 {}%
```

`\hyxmp@strip@isbn@date` Papers appearing in conference proceedings specify the proceedings’ ISBN. As `\hyxmp@acm@isbn` with `\@acmDOI` above, we ignore both the placeholder ISBN, “978-x-xxxx-xxxx-x/YY/MM”, and the example ISBN, “978-1-4503-XXXX-X/18/06”. We also strip off the “/*year*/*month*” suffix so as to include a true ISBN in the XMP metadata.

```
594 \if@def@and@nonempty{@acmISBN}{%
595     \IfSubStr{\@acmISBN}{XXXX}{-}{%
596         \IfSubStr{\@acmISBN}{xxxx}{-}{%
597             \def\hyxmp@strip@isbn@date##1/##2!{##1}%
598             \edef\hyxmp@acm@isbn{%
599                 \expandafter\hyxmp@strip@isbn@date\@acmISBN/!%
600             }%
601             \hyxmp@use@first@valid{pdfisbn}{\@pdfisbn}{%
602                 \hyxmp@acm@isbn
603             }%
604         }%
605     }%
606 }%
607 {}%
```

`\hyxmp@acm@publisher` The publisher is of course ACM.

```
608 \def\hyxmp@acm@publisher{Association for Computing Machinery}%
609 \hyxmp@use@first@valid{pdfpublisher}{\@pdfpublisher}{%
610     \hyxmp@acm@publisher
611 }
```

Use the journal name if defined, otherwise the book name (for conference proceedings).

```
612 \hyxmp@use@first@valid{pdfpublication}{\@pdfpublication}{%
613   \@journalName,%
614   \@acmBooktitle,%
615   \@acmConference
616 }%
```

`\hyxmp@acm@pubtype` acmart makes clear whether it's typesetting a journal article. If it's not a journal, we assume it's a book (conference proceedings).

```
617 \ifACM@journal
618   \def\hyxmp@acm@pubtype{journal}%
619 \else
620   \def\hyxmp@acm@pubtype{book}%
621 \fi
622 \hyxmp@use@first@valid{pdfpubtype}{\@pdfpubtype}{%
623   \hyxmp@acm@pubtype
624 }%
```

Journal articles have a volume and issue number.

```
625 \hyxmp@use@first@valid{pdfvolumenum}{\@pdfvolumenum}{%
626   \@acmVolume
627 }%
628 \hyxmp@use@first@valid{pdfissuenum}{\@pdfissuenum}{%
629   \@acmNumber
630 }%
631 }
```

Nullify `\hyxmp@parse@acmart` if the author is not using the acmart class.

```
632 \@ifclassloaded{acmart}{\let\hyxmp@parse@acmart=\relax}
```

`\hyxmp@dc@lang` `\hyxmp@dc@lang` is a comma-separated list of all languages used in the document.

```
633 \let\hyxmp@dc@lang=\@empty
```

`\hyxmp@detect@langs` If `pdflang` was not specified, try to determine the document language(s) using either `babel`'s or `polyglossia`'s definitions.

```
634 \newcommand*{\hyxmp@detect@langs}{%
635   \@ifundefined{mainbcp47id}{%
636     \@ifundefined{LocaleForEach}{%

```

The document doesn't appear to have loaded either `babel` or `polyglossia`. In this case we have one small task to do. In older versions of `hyperref`, `\@pdflang` is set to `\@empty` if `pdflang` is not specified. In newer versions of `hyperref`, `\@pdflang` is set to `\relax` if `pdflang` is not specified. The latter is a bit problematic for `hyperxmp` because it makes `\@pdflang` non-expandable, which causes a literal "`\@pdflang`" to be written as XMP metadata. To avoid that situation we explicitly set `\@pdflang` to `\@empty` to avoid problems with non-expandable symbols.

```
637   \let\@pdflang=\@empty
638 }{%
```

`\hyxmp@dc@lang` Use `babel`'s `\LocaleForEach` and `\getlocaleproperty` to set `\@pdflang` to the document's main language and `\hyxmp@dc@lang` to a comma-separated list of all languages used.

```
\@pdflang
```



```

639     \BabelEnsureInfo
640     \LocaleForEach{%
641       \getlocaleproperty\hyxmp@lang@tag{##1}{identification/tag.bcp47}%
642       \ifx\hyxmp@dc@lang\@empty
643         \xdef\hyxmp@dc@lang{\hyxmp@lang@tag}%
644       \else
645         \xdef\hyxmp@dc@lang{\hyxmp@dc@lang,\hyxmp@lang@tag}%
646       \fi
647       \def\hyxmp@lang@name{##1}%
648       \ifx\hyxmp@lang@name\bb1@main@language
649         \edef\@pdflang{\hyxmp@lang@tag}%
650       \fi
651     }%
652   }%
653 }{%
```

Use `polyglossia's` `\mainbcp47id` as the document's main language and its `\xpg@bcp@loaded` as a comma-separated list of all document languages.

```

654     \xdef\@pdflang{\csname mainbcp47id\endcsname}%
655     \edef\hyxmp@dc@lang{\xpg@bcp@loaded}%
656   }%
657 }
```

3.4 Manipulating author-supplied data

The author provides metadata information to `hyperxmp` via package options to `hyperref` or via `hyperref's` `\hypersetup` command. The functions in this section convert author-supplied lists (e.g., `pdfkeywords={foo, bar, baz}`) into \LaTeX lists (e.g., `\@elt {foo} \@elt {bar} \@elt {baz}`) that can be more easily manipulated (Section 3.4.1); parse dates in both PDF and XMP formats (Section 3.4.2); trim spaces off the ends of strings (Section 3.4.3); convert text to XML (e.g., from `<scott+hyxmp@pakin.org>` to `<scott+hyxmp@pakin.org>`) (Section 3.4.4); simplify the pretty-printing of a begin tag, XML text, and end tag (Section 3.4.5); and provide metadata in multiple languages (Section 3.4.6).

3.4.1 List manipulation

We define a macro for converting a list of comma-separated elements (e.g., the list of PDF keywords) to a list of \LaTeX `\@elt`-separated elements.

```

\hyxmp@commas@to@list Given a macro name (#1) and a comma-separated list (#2), define the macro name
as the elements of the list, each preceded by \@elt. (Executing the macro therefore
applies \@elt to each element in turn.)
658 \newcommand*\hyxmp@commas@to@list}[2]{%
659   \gdef#1{%
660     \expandafter\hyxmp@commas@to@list@i\expandafter#1#2,,%
661   }
```

```

\hyxmp@commas@to@list@i Recursively construct macro #1 from comma-separated list #2. Stop if #2 is empty.
\next 662 \def\hyxmp@commas@to@list@i#1#2,{%
663   \gdef\hyxmp@sublist{#2}%
664   \ifx\hyxmp@sublist\@empty
```

```

665     \let\next=\relax
666   \else
667     \hyxmp@trimspaces\hyxmp@sublist
668     \@cons{#1}{\hyxmp@sublist}}%
669     \def\next{\hyxmp@commas@to@list@i{#1}}%
670   \fi
671   \next
672 }

```

`\xmpcomma` Because hyperxmp splits lists at commas, a comma cannot normally be used within a list. We there provide an `\xmpcomma` macro that can expand to either a true comma or a placeholder character depending on the situation. Here, we bind it to a comma so it can be used in *any* hyperxmp option, not just those that treat commas specially.

```
673 \def\xmpcomma{,}%
```

`\hyxmp@comma` This is what `\xmpcomma` maps to during list construction. We assume that documents will never otherwise use an ETX ($\text{\^{}C}$) character in their XMP metadata.

```

674 \bgroup
675   \catcode'\^{}C=11
676   \gdef\hyxmp@comma{\^{}C}
677 \egroup

```

`\hyxmp@uscore` This is what `_` temporarily maps to during packet construction. Because underscores are replaced by spaces, we need a mechanism to preserve user-specified underscores (e.g., in email addresses). We assume that documents will never otherwise use an NAK ($\text{\^{}U}$) character in their XMP metadata.

```

678 \bgroup
679   \catcode'\^{}U=11
680   \gdef\hyxmp@uscore{\^{}U}
681 \egroup

```

`\xmpquote` Adobe Acrobat likes to see double quotes around list elements that contain commas when the entire list appears within a single XMP tag (e.g., `<pdf:Keywords>`). However, it doesn't like to see double quotes around list elements that contain commas when the list is broken up into individual components (i.e., using `<rdf:li>` tags). We therefore introduce an `\xmpquote` macro that quotes or doesn't quote its argument based on context. Here, we bind `\xmpquote` to `\relax` to prevent it from prematurely quoting or not quoting.

```
682 \let\xmpquote=\relax
```

`\xmptilde` As a convenience for the user, we define `\xmptilde` as a category 12 (other) “~” character.

```

683 \bgroup
684   \catcode'\~=12%
685   \gdef\xmptilde{\~}%
686 \egroup

```

`\XMPTruncateList` As a workaround for the inability of older Adobe Acrobat versions to display author lists correctly we introduce a hack that replaces a list with its first element.

```

\hyxmp@temp@str
\hyxmp@temp@list
  \@elt

```

One can then write “\XMPTruncateList{pdfauthor}” and have Adobe Acrobat display the author list correctly.

```

687 \newcommand{\XMPTruncateList}[1]{%
688   \PackageWarning{hyperxmp}{%
689     \noexpand\XMPTruncateList has been deprecated since\MessageBreak
690     hyperxmp 4.0 and may be removed in future\MessageBreak
691     versions of the package. \noexpand\XMPTruncateList\MessageBreak
692     was found}%
693   \edef\hyxmp@temp@str{\csname hyxmp@#1\endcsname}%
694   \hyxmp@commas@to@list{\hyxmp@temp@list}{\hyxmp@temp@str}%
695   \def\@elt##1{%
696     \expandafter\gdef\csname @#1\endcsname{##1}%
697     \let\@elt=\@gobble
698   }
699   \hyxmp@temp@list
700 }}

```

3.4.2 Date manipulation

hyperxmp needs to manipulate two types of date (really, timestamp) formats: PDF format and XMP format. PDF timestamps are of the form “D:YYYYMMDDhhmmss+TT’tt” (e.g., D:20230910194649-06’00’) [4], while XMP timestamps are of the form “YYYY-MM-DDThh:mm:ss+TT:tt” (e.g., 2023-09-10T19:46:49-06:00) [5]. The \hyxmp@as@pdf@date and \hyxmp@as@xmp@date macros defined in this section facilitate timestamp conversions to PDF and XMP formats, respectively.

`\hyxmp@first@char` Return the first character of a string. This macro is fully expandable.

```

\hyxmp@first@char@i 701 \def\hyxmp@first@char#1{\hyxmp@first@char@i#1\relax}
702 \def\hyxmp@first@char@i#1#2\relax{#1}

```

`\hyxmp@as@xmp@date` If necessary, convert a timestamp to XMP format. That is, if the timestamp is in PDF format, convert it; otherwise, leave it unmodified. This macro is fully expandable.

```

703 \def\hyxmp@as@xmp@date#1{%
704   \expandafter\ifnum\expandafter'\hyxmp@first@char@i#1\relax='D
705   \hyxmp@pdf@to@xmp@date{#1}%
706   \else
707     #1%
708   \fi
709 }

```

`\hyxmp@pdf@to@xmp@date` Convert a timestamp from PDF format to XMP format. This macro is fully expandable.

```

710 \def\hyxmp@pdf@to@xmp@date#1:#2#3#4#5#6#7#8#9{%
711   #2#3#4#5-#6#7-#8#9%
712   \hyxmp@parse@time
713 }

```

`\hyxmp@parse@time` This is a helper function for `\hyxmp@pdf@to@xmp@date`. `\hyxmp@pdf@to@xmp@date` proper parses only the year, month, and day

then calls `\hyxmp@parse@time`. `\hyxmp@parse@time` parses the hours, minutes, and seconds then calls `\hyxmp@parse@tz@char`.

```
714 \def\hyxmp@parse@time#1#2#3#4#5#6{%  
715   T#1#2:#3#4:#5#6%  
716   \hyxmp@parse@tz@char  
717 }
```

`\hyxmp@parse@tz@char` This is another helper function for `\hyxmp@pdf@to@xmp@date`. So far, the date and time have been parsed. `\hyxmp@parse@tz@char` parses the first character of the timezone descriptor. This can be one of “+” for eastern timezones (UTC+*x*, including Asia, Oceania, and most of Europe), “-” for western timezones (UTC-*x*, primarily the Americas), or “Z” for Zulu time (UTC+0). Timezones beginning with “+” or “-” are followed by an offset in hours and minutes (parsed by `\hyxmp@parse@tz`; timezones beginning with “Z” are not.

```
718 \def\hyxmp@parse@tz@char#1{%  
719   #1%  
720   \ifx#1-%  
721     \expandafter\hyxmp@parse@tz  
722   \else  
723     \ifx#1+%  
724       \expandafter\hyxmp@parse@tz  
725     \fi  
726   \fi  
727 }
```

`\hyxmp@parse@tz` This is the final helper function for `\hyxmp@pdf@to@xmp@date`. It parses the piece of the timezone comprising the offset from Coordinated Universal Time, measured in hours and minutes.

```
728 \def\hyxmp@parse@tz#1'#2' {%  
729   #1:#2%  
730 }
```

`\hyxmp@as@pdf@date` If necessary, convert a timestamp to PDF format. That is, if the timestamp is in XMP format, convert it; otherwise, leave it unmodified. This macro is fully expandable.

```
731 \def\hyxmp@as@pdf@date#1{%  
732   \expandafter\ifx\hyxmp@first@char@i#1\relax D%  
733   #1%  
734   \else  
735     \hyxmp@xmp@to@pdf@date{#1}%  
736   \fi  
737 }
```

`\hyxmp@xmp@to@pdf@date` Convert a timestamp from XMP format to PDF format. This macro is fully expandable.

```
738 \def\hyxmp@xmp@to@pdf@date#1{%  
739   D:\hyxmp@xmp@to@pdf@date@i#1\relax\relax  
740 }
```

`\hyxmp@xmp@to@pdf@date@i` Parse the year for `\hyxmp@xmp@to@pdf@date`.

```
741 \def\hyxmp@xmp@to@pdf@date@i#1#2#3#4#5#6{%  
742   #1#2#3#4%
```

```

743 \ifx#5-%
744   \expandafter\hyxmp@xmp@to@pdf@date@ii\expandafter#6%
745 \fi
746 }

```

`\hyxmp@xmp@to@pdf@date@ii` Parse the month for `\hyxmp@xmp@to@pdf@date`.

```

747 \def\hyxmp@xmp@to@pdf@date@ii#1#2#3#4{%
748   #1#2%
749   \ifx#3-%
750     \expandafter\hyxmp@xmp@to@pdf@date@iii\expandafter#4%
751   \fi
752 }

```

`\hyxmp@xmp@to@pdf@date@iii` Parse the day for `\hyxmp@xmp@to@pdf@date`.

```

753 \def\hyxmp@xmp@to@pdf@date@iii#1#2#3#4{%
754   #1#2%
755   \ifx#3T%
756     \expandafter\hyxmp@xmp@to@pdf@date@iv\expandafter#4%
757   \fi
758 }

```

`\hyxmp@xmp@to@pdf@date@iv` Parse the hour for `\hyxmp@xmp@to@pdf@date`.

```

759 \def\hyxmp@xmp@to@pdf@date@iv#1#2#3#4{%
760   #1#2%
761   \ifx#3:%
762     \expandafter\hyxmp@xmp@to@pdf@date@v\expandafter#4%
763   \fi
764 }

```

`\hyxmp@xmp@to@pdf@date@v` Parse the minute for `\hyxmp@xmp@to@pdf@date`.

```

765 \def\hyxmp@xmp@to@pdf@date@v#1#2#3#4{%
766   #1#2%
767   \ifx#3:%
768     \expandafter\hyxmp@xmp@to@pdf@date@vi\expandafter#4%
769   \fi
770 }

```

`\hyxmp@gobbletwo` This is exactly the same as \LaTeX 2_ϵ 's `\@gobbletwo` but needs to be a different literal for `\hyxmp@xmp@to@pdf@date@vii`'s pattern-matching to work.

```

771 \let\hyxmp@gobbletwo=\@gobbletwo

```

`\hyxmp@xmp@to@pdf@date@vi` Parse the second for `\hyxmp@xmp@to@pdf@date`. The challenge here is that we need to handle four cases for the character following the seconds—“+”, “-”, “Z”, and no character—without sacrificing expandability. Our tricky solution is to insert a `\@gobbletwo` as a sentinel and let `\hyxmp@xmp@to@pdf@date@vi` discard everything up to that sentinel (i.e., all the other conditionals).

```

772 \def\hyxmp@xmp@to@pdf@date@vi#1#2#3#4{%
773   #1#2%
774   \ifx#3+%
775     +\expandafter\hyxmp@xmp@to@pdf@date@vii
776   \fi
777   \ifx#3-%
778     -\expandafter\hyxmp@xmp@to@pdf@date@vii

```

```

779 \fi
780 \ifx#3Z%
781   Z%
782 \fi
783 \ifx#3\relax
784   \expandafter\hyxmp@gobbletwo
785 \fi
786 \@gobbletwo #4%
787 }

```

`\hyxmp@xmp@to@pdf@date@vii` Parse the time-zone hours for `\hyxmp@xmp@to@pdf@date`.

```

788 \def\hyxmp@xmp@to@pdf@date@vii#1\@gobbletwo#2#3#4#5{%
789   #2#3%
790   \ifx#4:%
791     \expandafter\hyxmp@xmp@to@pdf@date@viii\expandafter#5%
792   \fi
793 }

```

`\hyxmp@xmp@to@pdf@date@viii` Parse the time-zone minutes for `\hyxmp@xmp@to@pdf@date`.

```

794 \def\hyxmp@xmp@to@pdf@date@viii#1#2#3#4{%
795   '#1#2'%
796 }

```

`\hyxmp@today@xmp@define` Use \TeX primitives to define a given macro as today's date in YYYY-MM-DDThh:mmZ format.

```

797 \def\hyxmp@today@xmp@define#1{%

```

The date is a straightforward representation of \TeX 's `\year`, `\month`, and `\day` primitives, with the latter two zero-padded to two digits apiece.

```

798   \xdef#1{\the\year}%
799   \ifnum\month<10
800     \xdef#1{#1-0\the\month}%
801   \else
802     \xdef#1{#1-\the\month}%
803   \fi
804   \ifnum\day<10
805     \xdef#1{#1-0\the\day}%
806   \else
807     \xdef#1{#1-\the\day}%
808   \fi

```

\TeX does not provide the time in terms of separate hours and minutes but rather as the total number of minutes since midnight (`\time`). There's no mechanism in \TeX to query the number of seconds since midnight or the timezone so we omit those fields when defining macro `#1`.

```

809   \@hyxmp@count=\time
810   \divide\@hyxmp@count by 60
811   \ifnum\@hyxmp@count<10
812     \xdef#1{#1T0\the\@hyxmp@count}%
813   \else
814     \xdef#1{#1T\the\@hyxmp@count}%
815   \fi
816   \multiply\@hyxmp@count by -60
817   \advance\@hyxmp@count by \time

```

```

818 \ifnum\@hyxmp@count<10
819   \xdef#1{#1:0\the\@hyxmp@count}%
820 \else
821   \xdef#1{#1:\the\@hyxmp@count}%
822 \fi
823 \xdef#1{#1Z}%
824 }

```

`\hyxmp@try@today` If `\hyxmp@today@xmp` is still empty and `#1` is defined, evaluate `#2`. Otherwise, do nothing.

```

825 \def\hyxmp@try@today#1#2{%
826   \ifmtargexp{\hyxmp@today@xmp}{-%
827     \ifundefined{#1}{#2}%
828   }%
829 }%
830 }

```

`\hyxmp@today@xmp` Define `\hyxmp@today@xmp` as the current date and (if available) time and timezone in XMP Date format [5].

```
831 \def\hyxmp@today@xmp{}
```

Case 1: `\pdfcreationdate` is defined (pdfL^AT_EX and pre-0.85 LuaL^AT_EX).

```

832 \hyxmp@try@today{\pdfcreationdate}{-%
833   \edef\hyxmp@today@xmp{\expandafter\hyxmp@pdf@to@xmp@date\pdfcreationdate}%
834 }

```

Case 2: `\pdffeedback` is defined (LuaL^AT_EX 0.85+).

```

835 \hyxmp@try@today{\pdffeedback}{-%
836   \edef\hyxmp@today@xmp{\expandafter\hyxmp@pdf@to@xmp@date\pdffeedback creationdate}%
837 }

```

`\hyxmp@timestamp` Case 3: `\filemoddate` is defined (X_YL^AT_EX). In this case, we treat the timestamp of the job's `.log` file as the current date/time.

```

838 \hyxmp@try@today{\filemoddate}{-%
839   \edef\hyxmp@today@xmp{\filemoddate{\hyxmp@jobname.log}}%
840   \edef\next{-%
841     \edef\noexpand\hyxmp@today@xmp{\noexpand\hyxmp@as@xmp@date{\hyxmp@today@xmp}}%
842   }%
843   \next
844 }%

```

Case 4: None of the above. Do the best we can using the available T_EX primitives (`\year`, `\month`, `\day`, and `\time`).

```

845 \hyxmp@try@today{\year}{-%
846   \hyxmp@today@xmp@define\hyxmp@today@xmp
847 }

```

`\hyxmp@today@pdf` Define `\hyxmp@today@pdf` as the current date and (if available) time and timezone in PDF date format [4]. To do so we simply convert `\hyxmp@today@xmp`, defined above, from XMP to PDF using `\hyxmp@xmp@to@pdf@date`.

```

848 \expandafter\edef\expandafter\hyxmp@today@pdf\expandafter{-%
849   \expandafter\hyxmp@xmp@to@pdf@date\expandafter{\hyxmp@today@xmp}%
850 }

```

3.4.3 Trimming leading and trailing spaces

To make it easier for XMP processors to manipulate our output we define a `\hyxmp@trimspaces` macro to strip leading and trailing spaces from various data fields.

`\hyxmp@trimspaces` Redefine a macro as its previous value but without leading or trailing spaces. This code—as well as that for its helper macros, `\hyxmp@trimb` and `\hyxmp@trimc`—was taken almost verbatim from a solution to an *Around the Bend* puzzle [7]. Inline comments are also taken from the solution text.

```
851 \catcode'\Q=3
```

`\hyxmp@trimspaces\x` redefines `\x` to have the same replacement text sans leading and trailing space tokens.

```
852 \newcommand{\hyxmp@trimspaces}[1]{%
```

Use grouping to emulate a multi-token `afterassignment` queue.

```
853 \begingroup
```

Put “`\toks 0 {`” into the `afterassignment` queue.

```
854 \aftergroup\toks\aftergroup0\aftergroup{%
```

Apply `\hyxmp@trimb` to the replacement text of #1, adding a leading `\noexpand` to prevent brace stripping and to serve another purpose later.

```
855 \expandafter\hyxmp@trimb\expandafter\noexpand#1Q Q}%
```

Transfer the trimmed text back into #1.

```
856 \edef#1{\the\toks0}%
```

```
857 }
```

`\hyxmp@trimb` `\hyxmp@trimb` removes a trailing space if present, then calls `\hyxmp@trimc` to clean up any leftover bizarre Qs, and trim a leading space. In order for `\hyxmp@trimc` to work properly we need to put back a Q first.

```
858 \def\hyxmp@trimb#1 Q{\hyxmp@trimc#1Q}
```

`\hyxmp@trimc` Execute `\vfuzz` assignment to remove leading space; the `\noexpand` will now prevent unwanted expansion of a macro or other expandable token at the beginning of the trimmed text. The `\endgroup` will feed in the `\aftergroup` tokens after the `\vfuzz` assignment is completed.

```
859 \def\hyxmp@trimc#1Q#2{\afterassignment\endgroup \vfuzz\the\vfuzz#1}
```

```
860 \catcode'\Q=11
```

3.4.4 Converting text to XML

The “<”, “>”, and “&” characters are significant to XML. We therefore need to escape them in any author-supplied text.

`\ifhyxmp@unicodetex` X_YTeX and LuaTeX natively support Unicode. We define the conditional `\hyxmp@unicodetextrue` `\ifhyxmp@unicodetex` to check for these so we can properly handle encoding conversions. The trick here is that Unicode TeX implementations compare decimal 64 to hexadecimal 40 (decimal 64), specified with four carets, and take the TRUE branch; non-Unicode TeX implementations compare decimal 64 to character “^” (decimal 94), ignore the “^^0040” and the rest of the TRUE branch, and take the FALSE branch.


```

861 \newif\ifhyxmp@unicodetex
862 \ifnum64='\^^^0040\relax
863 \hyxmp@unicodetextrue
864 \else
865 \hyxmp@unicodetexfalse
866 \fi

```

\SE->pdfdoc@03 Preserve ETX ($\sim C$), which is normally an invalid character in PDFDocEncoding. We use it in hyperxmp (and specifically in \hyxmp@xmlify below) as a list-element separator.

```
867 \expandafter\def\csname SE->pdfdoc@03\endcsname{0003}
```

\SE->pdfdoc@15 Preserve NAK ($\sim U$), which is normally an invalid character in PDFDocEncoding. We use it in hyperxmp (and specifically in \hyxmp@xmlify below) as a placeholder for an underscore character.

```
868 \expandafter\def\csname SE->pdfdoc@15\endcsname{0015}
```

\hyxmp@xmlify Given a piece of text defined using \pdfstringdef (i.e., with many special characters redefined to have category code 11), set \hyxmp@xmlified to the same text but with all occurrences of “<” replaced with <; all occurrences of “>” replaced with >; and all occurrences of “&” replaced with &.

```

869 \newcommand*\hyxmp@xmlify}[1]{%
870 \gdef\hyxmp@xmlified{#1}%

```

Escaped PDF string \rightarrow PDFDocEncoding/Unicode

```

871 \EdefUnescapeString\hyxmp@text{#1}%
872 \ifhyxmp@unicodetex

```

PDFDocEncoding/Unicode \rightarrow UTF-32BE

```

873 \hyxmp@is@unicode\hyxmp@text{%
874 \StringEncodingConvert
875 \hyxmp@text\hyxmp@text{utf16be}{utf32be}%
876 }{%
877 \ifXeTeX
878 \hyxmp@xetex@crap
879 \else
880 \StringEncodingConvert
881 \hyxmp@text\hyxmp@text{pdfdoc}{utf32be}%
882 \fi
883 }%

```

UTF-32BE \rightarrow UTF-32BE as hex string

```
884 \EdefEscapeHex\hyxmp@text{\hyxmp@text}%
```

UTF-32BE \rightarrow XML in ASCII

```

885 \edef\hyxmp@text{%
886 \expandafter
887 }\expandafter\hyxmp@toxml@unicodetex\hyxmp@text
888 \relax\relax\relax\relax\relax\relax\relax\relax
889 \else

```

PDFDocEncoding/Unicode \rightarrow UTF-8

```

890 \hyxmp@is@unicode\hyxmp@text{%
891 \StringEncodingConvert
892 \hyxmp@text\hyxmp@text{utf16be}{utf8}%

```

```

893   }{%
894     \StringEncodingConvert
895     \hyxmp@text\hyxmp@text{pdfdoc}{utf8}%
896   }%
UTF-8 → UTF-8 as hex string
897   \EdefEscapeHex\hyxmp@text{\hyxmp@text}%
UTF-8 as hex string → XML in UTF-8 as hex string
898   \edef\hyxmp@text{%
899     \expandafter\hyxmp@toxml\hyxmp@text\@empty\@empty
900   }%
XML in UTF-8 as hex string → XML in UTF-8
901   \EdefUnescapeHex\hyxmp@text{\hyxmp@text}%
902   \fi
903   \global\let\hyxmp@xmlified\hyxmp@text
904 }

```

`\hyxmp@is@unicode` Given a string and two expressions, evaluate the first expression if the string is UTF-16BE-encoded and the second expression if not.

```

905 \begingroup
906 \lccode'\<=254 %
907 \lccode'\>=255 %
908 \catcode254=12 %
909 \catcode255=12 %
910 \lowercase{\endgroup
911 \def\hyxmp@is@unicode#1{%
912   \expandafter\hyxmp@@is@unicode#1<>\@nil
913 }%
914 \def\hyxmp@@is@unicode#1<>#2\@nil{%
915   \ifx\#1\%
916     \expandafter\@firstoftwo
917   \else
918     \expandafter\@secondoftwo
919   \fi
920 }%
921 }

```

`\hyxmp@toxml` Replace the characters “<”, “&”, and “>” with XML entities when using a non-native-Unicode T_EX (T_EX or pdfT_EX).

```

922 \def\hyxmp@toxml#1#2{%
923   \ifx#1\@empty
924   \else
925     \ifnum"#1#2='& %
926       26616D703B% &amp;
927     \else\ifnum"#1#2='\< %
928       266C743B% &lt;t;
929     \else\ifnum"#1#2='\> %
930       2667743B% &gt;t;
931   \else

```

`dvips` wraps text when generating most PostScript code but preserves line breaks within strings. Unfortunately, `dvips` fails to observe the special case in the PostScript specification that “[b]alanced pairs of parentheses in the string require no special treatment” [3]. Consequently, XMP data containing parentheses

(e.g., “Copyright (C) 1605 Miguel de Cervantes”) confuse `dvips` into thinking that the string has ended after the closing parenthesis and that line breaks can subsequently be injected safely into the document at arbitrary points for formatting purposes. This leads to erroneous display by PDF viewers, which honor line breaks within XMP tags. The solution is to insert a backslash before all parentheses when in `pdfmark`-generating mode to convince `dvips` that the entire XMP packet must be treated as a single, not-to-be-modified string.

```

932     \@ifundefined{pdfmark}{%
933         #1#2%
934     }{%
935     \ifnum"#1#2='\( %
936         5C28% \(\
937     \else\ifnum"#1#2='\) %
938         5C29% \)
939     \else
940         #1#2%
941     \fi\fi
942     }%
943     \fi\fi\fi
944     \expandafter\hyxmp@toxml
945     \fi
946 }

```

`\hyxmp@toxml@unicodetex` Replace the characters “<”, “&”, and “>” with XML entities when using a native-Unicode T_EX (X_Y T_EX or LuaT_EX).

```

\hyxmp@text
947 \def\hyxmp@toxml@unicodetex#1#2#3#4#5#6#7#8{%
948     \ifx#1\relax
949     \else
950     \ifnum"#1#2#3#4#5#6#7#8>127 %
951     \uccode'\*"#1#2#3#4#5#6#7#8\relax
952     \uppercase{%
953     \edef\hyxmp@text{\hyxmp@text *}%
954     }%
955     \else\ifnum"#7#8='\< %
956     \edef\hyxmp@text{\hyxmp@text &lt;};%
957     \else\ifnum"#7#8='\& %
958     \edef\hyxmp@text{\hyxmp@text &};%
959     \else\ifnum"#7#8='\> %
960     \edef\hyxmp@text{\hyxmp@text &};%
961     \else\ifnum"#7#8='\ %
962     \edef\hyxmp@text{\hyxmp@text\space}%
963     \else
964     \uccode'\*"#7#8\relax
965     \uppercase{%
966     \edef\hyxmp@text{\hyxmp@text *}%
967     }%
968     \fi\fi\fi\fi\fi
969     \expandafter\hyxmp@toxml@unicodetex
970     \fi
971 }

```

`\hyxmp@skipzeros` Skip over leading zeroes in the input argument.

```

972 \def\hyxmp@skipzeros#1{%

```

```

973 \ifx#10%
974   \expandafter\hyxmp@skipzeros
975 \fi
976 }

```

`\x` In the case of $X_{\text{g}}\text{TeX}$, the strings defined by `\pdfstringdef` can contain big characters. In this case, the string is treated as Unicode.

```

\hyxmp@xetex@crap
  \hyxmp@try 977 \begingroup
\hyxmp@crap@result 978 \def\x#1{\endgroup
  \hyxmp@text 979 \def\hyxmp@xetex@crap{%
980   \edef\hyxmp@try{%
981     \expandafter\hyxmp@SpaceOther\hyxmp@text#1\@nil
982   }%
983   \let\hyxmp@crap@result=N%
984   \expandafter\hyxmp@crap@test\hyxmp@try\relax
985   \ifx\hyxmp@crap@result Y%
986     \let\hyxmp@text\@empty
987     \expandafter\hyxmp@crap@convert\hyxmp@try\relax
988   \else
989     \StringEncodingConvert\hyxmp@text\hyxmp@text{pdfdoc}{utf32be}%
990   \fi
991 }%
992 }
993 \x{ }

```

`\hyxmp@SpaceOther` Re-encode all spaces in a string with category code 12 (“other”).

```

994 \begingroup
995 \catcode'\~ =12 %
996 \lccode'\~ =\ %
997 \lowercase{\endgroup
998 \def\hyxmp@SpaceOther#1 #2\@nil{%
999   #1%
1000   \ifx\relax#2\relax
1001     \expandafter\@gobble
1002   \else
1003     ~%
1004     \expandafter\@firstofone
1005   \fi
1006   {\hyxmp@SpaceOther#2\@nil}%
1007 }%
1008 }

```

`\hyxmp@crap@test` Determine if we need to treat a string as Unicode.

```

1009 \def\hyxmp@crap@test#1{%
1010   \ifx#1\relax
1011   \else
1012     \ifnum'#1>127 %
1013       \let\hyxmp@crap@result=Y%
1014       \expandafter\expandafter\expandafter\hyxmp@skiptorelax
1015     \else
1016       \expandafter\expandafter\expandafter\hyxmp@crap@test
1017     \fi
1018   \fi
1019 }

```

```

\hyxmp@skiptorelax Discard all tokens up to and including the first \relax.
1020 \def\hyxmp@skiptorelax#1\relax{}

\hyxmp@crap@convert Convert a hexadecimal string to a number.
  \hyxmp@num 1021 \def\hyxmp@crap@convert#1{%
\hyxmp@text 1022   \ifx#1\relax
1023     \else
1024       \edef\hyxmp@num{\number'#1}%
1025       \ifnum\hyxmp@num>"FFFFFF %
1026         \lccode'\!=\intcalDiv{\hyxmp@num}{\number"1000000}\relax
1027         \lowercase{\edef\hyxmp@text{\hyxmp@text!}}%
1028         \edef\hyxmp@num{\intcalMod{\hyxmp@num}{\number"1000000}}%
1029       \else
1030         \edef\hyxmp@text{\hyxmp@text\hyxmp@zero}%
1031       \fi
1032       \ifnum\hyxmp@num>"FFFF %
1033         \lccode'\!=\intcalDiv{\hyxmp@num}{\number"10000}\relax
1034         \lowercase{\edef\hyxmp@text{\hyxmp@text!}}%
1035         \edef\hyxmp@num{\intcalMod{\hyxmp@num}{\number"10000}}%
1036       \else
1037         \edef\hyxmp@text{\hyxmp@text\hyxmp@zero}%
1038       \fi
1039       \ifnum\hyxmp@num>"FF %
1040         \lccode'\!=\intcalDiv{\hyxmp@num}{\number"100}\relax
1041         \lowercase{\edef\hyxmp@text{\hyxmp@text!}}%
1042         \edef\hyxmp@num{\intcalMod{\hyxmp@num}{\number"100}}%
1043       \else
1044         \edef\hyxmp@text{\hyxmp@text\hyxmp@zero}%
1045       \fi
1046       \ifnum\hyxmp@num>0 %
1047         \lccode'\!=\hyxmp@num\relax
1048         \lowercase{\edef\hyxmp@text{\hyxmp@text!}}%
1049       \else
1050         \edef\hyxmp@text{\hyxmp@text\hyxmp@zero}%
1051       \fi
1052       \expandafter\hyxmp@crap@convert
1053     \fi
1054 }

\hyxmp@zero Define a null character with category code 12 ("other").
1055 \begingroup
1056   \catcode0=12 %
1057   \gdef\hyxmp@zero{^^00}%
1058 \endgroup

```

3.4.5 Outputting structured XML

An XMP packet consists of structured XML data. We define some helper routines to handle the repetitive tasks of indenting a consistent number of spaces, inserting begin and end tags, and escaping arbitrary text as necessary for XML compatibility.

```

\hyxmp@extra@indent This macro is used internally to increase the amount of indentation when writing
certain XML data. It is normally defined as empty but can temporarily be redefined
to a sequence of \space characters.

```

```
1059 \newcommand*{\hyxmp@extra@indent}{}
```

`\hyxmp@add@simple` Given an XMP tag (#1) and a string (#2), if the string is nonempty, add a begin tag, the string, and an end tag to the packet. The “simple” in the macro name indicates that the string is output without variations for different languages.

```
1060 \newcommand*{\hyxmp@add@simple}[2]{%
1061   \@ifnotmtargexp{#2}{%
1062     \hyxmp@xmlify{#2}%
1063     \hyxmp@add@to@xml{\hyxmp@extra@indent_____<}%
1064     \xdef\hyxmp@xml{\hyxmp@xml#1}%
1065     \hyxmp@add@to@xml{>\hyxmp@xmlified</}%
1066     \xdef\hyxmp@xml{\hyxmp@xml#1>^^J}%
1067   }%
1068 }
```

`\hyxmp@add@simple@var` Given an XMP tag (#1) and a variable name (#2), if the string is defined, add a begin tag, the string, and an end tag to the packet. The “simple” in the macro name indicates that the string is output without variations for different languages. `\hyxmp@add@simple@var` differs from `\hyxmp@add@simple` in that the former includes defined but empty values in the XMP packet while the latter excludes both undefined and defined but empty values.

```
1069 \newcommand*{\hyxmp@add@simple@var}[2]{%
1070   \expandafter\ifx\csname#2\endcsname\relax
1071   \else
1072     \hyxmp@xmlify{\csname#2\endcsname}%
1073     \hyxmp@add@to@xml{%
1074       \hyxmp@extra@indent_____<#1>\hyxmp@xmlified</#1>^^J%
1075     }%
1076   \fi
1077 }
```

`\hyxmp@add@simple@lang` Given an XMP tag (#1) and a string (#2), if the string is nonempty, add a begin tag, the string, and an end tag to the packet. The “simple” in the macro name indicates that the string is output without variations for different languages. However, if the string begins with a language code in square brackets, specify that as the (sole) language for the tag.

```
1078 \newcommand*{\hyxmp@add@simple@lang}[2]{%
1079   \@ifnotmtarg{#2}{%
1080     \hyxmp@xmlify{#2}%
1081     \expandafter\hyxmp@add@simple@lang@i\hyxmp@xmlified\relax{#1}%
1082   }%
1083 }
```

`\hyxmp@add@simple@lang@i` This is a helper macro for `\hyxmp@add@simple@lang`. It takes an optional language code (in brackets), text up to `\relax`, and a tag, and typesets the text within the XML tag.

```
1084 \newcommand*{\hyxmp@add@simple@lang@i}{%
1085   \@ifnextchar[\hyxmp@add@simple@lang@ii{\hyxmp@add@simple@lang@ii[\pdfmetalang]}%
1086 }
```

`\hyxmp@add@simple@lang@ii` This is another helper macro for `\hyxmp@add@simple@lang`. It takes a mandatory language code (in brackets; can be empty), text up to `\relax`, and a tag, and typesets the text within the XML tag.

```

1087 \def\hyxmp@add@simple@lang@ii[#1]#2\relax#3{%
1088   \@ifnotmtarg{#2}{%
1089     \hyxmp@xmlify{#2}%
1090     \@ifmtarg{#1}{%
1091       \hyxmp@add@to+xml{%
1092   -----<#3>\hyxmp@xmlified</#3>^^J%
1093     }%
1094   }{%
1095     \hyxmp@add@to+xml{%
1096   -----<#3 xml:lang="#1">\hyxmp@xmlified</#3>^^J%
1097     }%
1098   }%
1099   }%
1100 }

```

`\hyxmp@add@simple@pfx` Given an XMP tag (#1), a—typically hard-wired—prefix string (#2), and a main string (#3), if the main string is nonempty, add a begin tag, both strings, and an end tag to the packet. The “simple” in the macro name indicates that the string is output without variations for different languages.

```

1101 \newcommand*\hyxmp@add@simple@pfx}[3]{%
1102   \@ifnotmtargexp{#3}{%
1103     \hyxmp@add@to+xml{\hyxmp@extra@indent-----<}%
1104     \xdef\hyxmp+xml{\hyxmp+xml#1}%
1105     \hyxmp@pdfstringdef\hyxmp@iprefix{#2}%
1106     \hyxmp@xmlify{\hyxmp@iprefix}%
1107     \hyxmp@add@to+xml{>\hyxmp@xmlified}%
1108     \hyxmp@xmlify{#3}%
1109     \hyxmp@add@to+xml{\hyxmp@xmlified</}%
1110     \xdef\hyxmp+xml{\hyxmp+xml#1>^^J}%
1111   }%
1112 }

```

3.4.6 Providing metadata in multiple languages

Certain XMP tags—`dc:title`, `dc:description`, and `dc:rights` (and others? Let me know.)—can be expressed in multiple languages. The same text is used for both language `pdfmetalang` (default: `pdflang`) and language “x-default”. To express the same metadata in multiple languages, we provide an `\XMPLangAlt` macro to construct a list of alternative forms for a piece of metadata.

`\hyxmp@alt@title` Each of these macros is a list in which each element is of the form “`\do <language>`
`\hyxmp@alt@description` `<text>`” in which `<language>` is an ISO 639-1 two-letter country code with an optional
`\hyxmp@alt@rights` ISO 3166-1 two-letter region code. For example, `\hyxmp@alt@title` may contain
an element, “`\do {es-MX} {Este es mi documento}`”.

```

1113 \def\hyxmp@alt@title{}
1114 \def\hyxmp@alt@description{}
1115 \def\hyxmp@alt@rights{}

```

`\hyxmp@LA@accept` This macro wraps `\define@key` to make the option “`#1=<value>`” append `<value>` to list #2.

```

1116 \newcommand\hyxmp@LA@accept}[2]{%
1117   \define@key{hyxmp@LA}{#1}{%

```

`\hyxmp@value` As Niklas Beisert observed, if the option passed to the current key contains L^AT_EX code, this code will be included in the XMP packet, which is undesirable. Hence, we first clean up the string using `\hyxmp@pdfstringdef`.

```
1118 \hyxmp@pdfstringdef\hyxmp@value{##1}%
1119 \xdef#2{#2\noexpand\do {\hyxmp@cur@lang} {\hyxmp@value}}%
1120 }
1121 }
```

Define $\langle key \rangle = \langle value \rangle$ options for appending to each of the `\hyxmp@alt<tag>` lists.

```
1122 \hyxmp@LA@accept{pdftitle}{\hyxmp@alt@title}
1123 \hyxmp@LA@accept{pdfsubject}{\hyxmp@alt@description}
1124 \hyxmp@LA@accept{pdfcopyright}{\hyxmp@alt@rights}
```

`\XMPLangAlt` Argument #1 is a language expressed as a two-letter country code and optional two-letter region code. Argument #2 is a list of $\langle key \rangle = \langle value \rangle$ pairs. Keys correspond to `\hypersetup` options such as “pdftitle”, “pdfsubject”, and “pdfcopyright”. Values are the alternative-language form of the text provided for the corresponding option.

```
1125 \newcommand{\XMPLangAlt}[2]{%
1126 \let\do=\relax
```

`\hyxmp@cur@lang` Store the provided language, which will be used during option processing.

```
1127 \edef\hyxmp@cur@lang{#1}%
1128 \setkeys{hyxmp@LA}{#2}%
1129 }
```

3.5 UUID generation

We use a linear congruential generator to produce pseudorandom version 4 UUIDs [12]. True, this method has its flaws but it’s simple to implement in T_EX and is good enough for producing the XMP `xmpMM:DocumentID` and `xmpMM:InstanceID` fields.

`\hyxmp@modulo@a` Replace the contents of `\@hyxmp@count` with the contents modulo #1. Note that `\@tempcntb` is overwritten in the process.

```
1130 \def\hyxmp@modulo@a#1{%
1131 \@tempcntb=\@hyxmp@count
1132 \divide\@tempcntb by #1
1133 \multiply\@tempcntb by #1
1134 \advance\@hyxmp@count by -\@tempcntb
1135 }
```

`\hyxmp@big@prime` Define a couple of large prime numbers that can still be stored in a T_EX counter.

```
\hyxmp@big@prime@ii 1136 \def\hyxmp@big@prime{536870923}
1137 \def\hyxmp@big@prime@ii{536870027}
```

`\hyxmp@seed@rng` Seed hyperxmp’s random-number generator from a given piece of text.

```
\hyxmp@one@token 1138 \def\hyxmp@seed@rng#1{%
1139 \@hyxmp@count=\hyxmp@big@prime
1140 \futurelet\hyxmp@one@token\hyxmp@seed@rng@i#1\@empty
1141 }
```


`\hyxmp@seed@rng@i` Do all of the work for `\hyxmp@seed@rng`. For each character code c of the input `\hyxmp@one@token` text, assign $\@hyxmp@count \leftarrow 3 \cdot \@hyxmp@count + c \pmod{\hyxmp@big@prime}$.

```

\next 1142 \def\hyxmp@seed@rng@i{%
1143   \ifx\hyxmp@one@token\@empty
1144     \let\next=\relax
1145   \else
1146     \def\next##1{%
1147       \multiply\@hyxmp@count by 3
1148       \advance\@hyxmp@count by '##1
1149       \hyxmp@modulo@a{\hyxmp@big@prime}%
1150       \futurelet\hyxmp@one@token\hyxmp@seed@rng@i
1151     }%
1152   \fi
1153 \next
1154 }

```

`\hyxmp@set@rand@num` Advance `\hyxmp@rand@num` to the next pseudorandom number in the sequence. Specifically, we assign $\hyxmp@rand@num \leftarrow 3 \cdot \hyxmp@rand@num + \hyxmp@big@prime@ii \pmod{\hyxmp@big@prime}$. Note that both `\@hyxmp@count` and `\@tempcntb` are overwritten in the process.

```

1155 \def\hyxmp@set@rand@num{%
1156   \@hyxmp@count=\hyxmp@rand@num
1157   \multiply\@hyxmp@count by 3
1158   \advance\@hyxmp@count by \hyxmp@big@prime@ii
1159   \hyxmp@modulo@a{\hyxmp@big@prime}%
1160   \xdef\hyxmp@rand@num{\the\@hyxmp@count}%
1161 }

```

`\hyxmp@append@hex` Append a randomly selected hexadecimal digit to macro `#1`. Note that both `\@hyxmp@count` and `\@tempcntb` are overwritten in the process.

```

1162 \def\hyxmp@append@hex#1{%
1163   \hyxmp@set@rand@num
1164   \@hyxmp@count=\hyxmp@rand@num
1165   \hyxmp@modulo@a{16}%
1166   \ifnum\@hyxmp@count<10
1167     \xdef#1{#1\the\@hyxmp@count}%
1168   \else

```

There *must* be a better way to handle the numbers 10–15 than with `\ifcase`.

```

1169     \advance\@hyxmp@count by -10
1170     \ifcase\@hyxmp@count
1171       \xdef#1{#1a}%
1172     \or\xdef#1{#1b}%
1173     \or\xdef#1{#1c}%
1174     \or\xdef#1{#1d}%
1175     \or\xdef#1{#1e}%
1176     \or\xdef#1{#1f}%
1177   \fi
1178 \fi
1179 }

```

`\hyxmp@append@hex@iii` Invoke `\hyxmp@append@hex` three times.

```

1180 \def\hyxmp@append@hex@iii#1{%

```

```

1181 \hyxmp@append@hex#1%
1182 \hyxmp@append@hex#1%
1183 \hyxmp@append@hex#1%
1184 }

```

`\hyxmp@append@hex@iv` Invoke `\hyxmp@append@hex` four times.

```

1185 \def\hyxmp@append@hex@iv#1{%
1186 \hyxmp@append@hex@iii#1%
1187 \hyxmp@append@hex#1%
1188 }

```

`\hyxmp@create@uuid` As per the definition of a version 4 UUID [12], define macro #1 as a UUID of the form “`uuid:xxxxxxxx-xxxx-4xxx-yxxx-xxxxxxxxxxxx`” in which each “`x`” is a lowercase hexadecimal digit and “`y`” is one of “8”, “9”, “a”, or “b”. We assume that the random-number generator is already seeded. Note that `\hyxmp@create@uuid` overwrites both `\@hyxmp@count` and `\@tempcntb`.

```

1189 \def\hyxmp@create@uuid#1{%
1190 \def#1{uuid:}%
1191 \hyxmp@append@hex@iv#1%
1192 \hyxmp@append@hex@iv#1%
1193 \g@addto@macro#1{-}%
1194 \hyxmp@append@hex@iv#1%
1195 \g@addto@macro#1{-4}%
1196 \hyxmp@append@hex@iii#1%
1197 \g@addto@macro#1{-}%

```

Randomly select one of “8”, “9”, “a”, or “b”.

```

1198 \hyxmp@set@rand@num
1199 \@hyxmp@count=\hyxmp@rand@num
1200 \hyxmp@modulo@a{4}%
1201 \ifcase\@hyxmp@count
1202 \g@addto@macro#1{8}%
1203 \or\g@addto@macro#1{9}%
1204 \or\g@addto@macro#1{a}%
1205 \or\g@addto@macro#1{b}%
1206 \fi
1207 \hyxmp@append@hex@iii#1%
1208 \g@addto@macro#1{-}%
1209 \hyxmp@append@hex@iv#1%
1210 \hyxmp@append@hex@iv#1%
1211 \hyxmp@append@hex@iv#1%
1212 }

```

`\hyxmp@def@DocumentID` Seed the random-number generator with a function of the current filename, PDF `\hyxmp@DocumentID` document title, and PDF author, then invoke `\hyxmp@create@uuid` to define `\hyxmp@seed@string` `\hyxmp@DocumentID` as a random UUID.

```

1213 \newcommand*{\hyxmp@def@DocumentID}{%
1214 \edef\hyxmp@seed@string{\hyxmp@jobname:\@pdftitle:\@pdfauthor:}%
1215 \expandafter\hyxmp@seed@rng\expandafter{\hyxmp@seed@string}%
1216 \edef\hyxmp@rand@num{the\@hyxmp@count}%
1217 \hyxmp@create@uuid\hyxmp@DocumentID
1218 }

```

`\hyxmp@def@InstanceID` Seed the random-number generator with a function of the current filename, `\hyxmp@InstanceID` PDF document title, PDF author, and the current timestamp, then invoke `\hyxmp@seed@string` `\hyxmp@create@uuid` to define `\hyxmp@InstanceID` as a random UUID. For the current timestamp, we use both the document-specified timestamp from `pdfdate` and the `TEX` time. The former can be more precise (to sub-seconds) but may be less random (as it depends on manual document modifications) while the latter is typically less precise (to minutes) but may be more random (as it is updated automatically).

```

1219 \newcommand*{\hyxmp@def@InstanceID}{%
1220   \hyxmp@today@xmp@define{\hyxmp@seed@string}%
1221   \edef\hyxmp@seed@string{%
1222     \hyxmp@jobname:\@pdftitle:\@pdfauthor:\hyxmp@today@xmp:\hyxmp@seed@string
1223   }%
1224   \expandafter\hyxmp@seed@rng\expandafter{\hyxmp@seed@string}%
1225   \edef\hyxmp@rand@num{\the\@hyxmp@count}%
1226   \hyxmp@create@uuid\hyxmp@InstanceID
1227 }
```

3.6 Constructing the XMP packet

An XMP packet “shall consist of the following, in order: a header PI, the serialized XMP data model (the XMP packet) with optional white-space padding, and a trailer PI” [5]. (“PI” is an abbreviation for “processing instructions”). The serialized XMP includes blocks of XML for various XMP schemata: Adobe PDF (Section 3.6.2), Dublin Core (Section 3.6.3), XMP Rights Management (Section 3.6.4), XMP Media Management (Section 3.6.5), XMP Basic (Section 3.6.6), Photoshop (Section 3.6.7), PDF/* Identification (Section 3.6.8), IPTC Photo Metadata (Section 3.6.9), PRISM Basic Metadata (Section 3.6.10), Journal Article Versions (Section 3.6.11), and XMP Paged-Text (Section 3.6.12). The `\hyxmp@construct@packet` macro (Section 3.6.14) constructs the XMP packet into `\hyxmp+xml`. It first writes the appropriate XML header, then calls the various schema-writing macros, then injects `\hyxmp@padding` as padding, and finally writes the appropriate XML trailer.

3.6.1 XMP utility functions

`\hyxmp@add@to+xml` Given a piece of text, replace all underscores with category-code 11 (“other”) spaces and all `~C` characters with commas, then append the result to the `\hyxmp+xml` macro.

```

1228 \newcommand*{\hyxmp@add@to+xml}[1]{%
1229   \bgroup
1230     \@hyxmp@count=0
1231     \ifhyxmp@unicodetex
1232       \@tempcntb=65536%
1233     \else
1234       \@tempcntb=256%
1235     \fi
1236     \loop
1237       \lccode\@hyxmp@count=\@hyxmp@count
1238       \advance\@hyxmp@count by 1
1239       \ifnum\@hyxmp@count<\@tempcntb
1240     \repeat
```

```

1241 \lccode'\_=' \relax
1242 \lccode'\^^C=' \relax
1243 \lccode'\^^U=' \relax
1244 \lowercase{\xdef\hyxmp@new@xml{#1}}%
1245 \xdef\hyxmp@xml{\hyxmp@xml\hyxmp@new@xml}%
1246 \egroup
1247 }

```

`\hyxmp@hash` Define a category-code 11 (“other”) version of the “#” character.

```

1248 \bgroup
1249 \catcode'\#=11
1250 \gdef\hyxmp@hash{#}
1251 \egroup

```

`\hyxmp@padding` The XMP specification recommends leaving approximately 2000 bytes of whitespace at the end of each XMP packet to facilitate editing the packet in place [5]. `\hyxmp@padding` is defined to contain 32 lines of 63 spaces and a newline apiece for a total of 2048 characters of whitespace.

```

1252 \bgroup
1253 \xdef\hyxmp@xml{}%
1254 \hyxmp@add@to@xml{%
1255 -----
1256 }
1257 \xdef\hyxmp@padding{\hyxmp@xml}%
1258 \egroup
1259 \xdef\hyxmp@padding{\hyxmp@padding\hyxmp@padding}
1260 \xdef\hyxmp@padding{\hyxmp@padding\hyxmp@padding}
1261 \xdef\hyxmp@padding{\hyxmp@padding\hyxmp@padding}
1262 \xdef\hyxmp@padding{\hyxmp@padding\hyxmp@padding}
1263 \xdef\hyxmp@padding{\hyxmp@padding\hyxmp@padding}

```

`\hyxmp@x@default` Define an x-default string that we can use in comparisons with `\@pdfmetalang`.

```

1264 \newcommand*{\hyxmp@x@default}{x-default}

```

3.6.2 The Adobe PDF schema

Older versions of `hyperref` defined a default producer; newer versions do not. Instead, they let the `TEX` engine define the producer itself. This poses a problem for PDF/A compliance because `hyperxmp` sees an empty producer and therefore omits writing a `pdf:Producer` to the XMP packet, causing a mismatch between the data in the XMP packet and the data in the PDF `Info` dictionary. To ensure consistency between XMP and `Info`, we explicitly define our own default `\@pdfproducer` here.

`\@pdfproducer` Define `\@pdfproducer` using the banner string if available or the `TEX` engine’s `\hyxmp@define@pdfproducer` version number if not.

```

1265 \newcommand*{\hyxmp@define@pdfproducer}{%
1266 \gdef\@pdfproducer{TeX}
1267 \ifLuaTeX
1268 \expandafter\hyxmp@banner@to@producer\expandafter{\luatexbanner}%
1269 \else
1270 \ifPDFTeX
1271 \expandafter\hyxmp@banner@to@producer\expandafter{\pdftexbanner}%
1272 \else

```

```

1273     \ifXeTeX
1274         \edef\@pdfproducer{XeTeX version \the\XeTeXversion\XeTeXrevision}%
1275     \fi
1276 \fi
1277 \fi
1278 }

```

`\@pdfproducer` Define `\@pdfproducer` as the T_EX engine’s banner string (e.g., “This is `\hyxmp@banner@to@producer` LuaHBTeX, Version 1.17.0 (TeX Live 2023)”), removing the initial “This is” if possible (specifically, when ϵ -T_EX’s `\scantokens` primitive is available).

```

1279 \def\hyxmp@banner@to@producer#1{%
1280     \ifx\scantokens\relax
1281         \gdef\@pdfproducer{#1}%
1282     \else
1283         {\scantokens{\makeatletter\hyxmp@remove@this#1\relax}}%
1284     \fi
1285 }

```

`\@pdfproducer` Define `\@pdfproducer` as a given banner string with the initial “This is” stripped `\hyxmp@remove@this` off the beginning.

```

1286 \def\hyxmp@remove@this This is #1\relax{\gdef\@pdfproducer{#1}}

```

If `pdfproducer` wasn’t specified and `hyperref` didn’t already define `\@pdfproducer`—old versions of `hyperref` did; newer ones don’t—try to assign a meaningful producer string and use that.

```

1287 \AtBeginDocument{%
1288     \ifx\@pdfproducer\relax
1289         \hyxmp@define@pdfproducer
1290     \fi
1291 }

```

`\hyxmp@assign@major@minor` Assign `\hyxmp@major@minor` to be the PDF version targeted by the running T_EX engine.

`\hyxmp@major@minor`

```

1292 \newcommand*\hyxmp@assign@major@minor{%
1293     \@ifundefined{pdfvariable}{%
1294         \@ifundefined{pdfminorversion}{%

```

Case 1: Neither `\pdfvariable` nor `\pdfminorversion` is defined (X_ƎL^AT_EX and regular L^AT_EX).

```

1295     }{%

```

Case 2: `\pdfminorversion` is defined (pdfL^AT_EX and pre-0.85 LuaL^AT_EX).

```

1296         \xdef\hyxmp@major@minor{\the\pdfminorversion}%
1297         \@ifundefined{pdfmajorversion}{%

```

Case 2(a): `\pdfmajorversion` is not defined (older versions of pdfL^AT_EX and LuaL^AT_EX).

```

1298         \xdef\hyxmp@major@minor{1.\hyxmp@major@minor}%
1299     }{%

```

Case 2(b): `\pdfmajorversion` is defined (pdfL^AT_EX 1.40.21+).

```

1300         \xdef\hyxmp@major@minor{\the\pdfmajorversion.\hyxmp@major@minor}%
1301     }%

```

```

1302   }%
1303 }{%
Case 3: \pdfvariable is defined (LuaLATEX 0.85+).
1304   \xdef\hyxmp@major@minor{\the\pdfvariable majorversion.\the\pdfvariable minorversion}%
1305   }%
1306 }

```

`\hyxmp@pdf@schema` Add properties defined by the Adobe PDF schema to the `\hyxmp@xml` macro.

```

1307 \newcommand*{\hyxmp@pdf@schema}{%
Add a block of XML to \hyxmp@xml that lists the document's keywords (the
pdf:Keywords property), the tools used to produce the PDF file (the pdf:Producer
property), and the version of the PDF standard adhered to (the pdf:PDFVersion
property). Unlike most of the other schemata that hyperxmp supports, the Adobe
PDF schema is always included in the document, even if all of its keys are empty.
This is because PDF/A-1b requires the keywords and producer to be the same in
the XMP metadata and the PDF metadata. Because hyperref always specifies the
Keywords and Producer fields, even when they're empty, hyperxmp has to follow
suit and define pdf:Keywords and pdf:Producer in the XMP packet.
1308   \hyxmp@add@simple@var{pdf:Producer}{\pdfproducer}%
1309   \hyxmp@add@simple@var{pdf:Keywords}{\pdfkeywords}%
1310   \hyxmp@add@simple{pdf:Trapped}{\pdftrapped}%
1311   \hyxmp@assign@major@minor
1312   \hyxmp@add@simple@var{pdf:PDFVersion}{\hyxmp@major@minor}%
1313 }

```

3.6.3 The Dublin Core schema

`\ifhyxmp@multi@langs` These macros are used locally to `\hyxmp@rdf@dc`. If the property being processed has values in different languages, `\ifhyxmp@multi@langs` evaluates to TRUE. If it has a value in only a single language, `\ifhyxmp@multi@langs` evaluates to FALSE.

```

1314 \newif\ifhyxmp@multi@langs

```

`\hyxmp@rdf@dc` Given an optional `\if<something>` statement (#1), a Dublin Core property (#2) and a macro containing some `\pdfstringdef`-defined text (#3), append the appropriate block of XML to the `\hyxmp@xml` macro.

```

1315 \newcommand*{\hyxmp@rdf@dc}[3][\iffalse]{%
Set \@tempswatrue only if the given text is nonempty or the provided conditional
evaluates to TRUE.
1316   \ifmtargexp{#3}{\@tempswafalse}{\@tempswatrue}%
1317   #1
1318   \@tempswatrue
1319   \fi

```

Append the corresponding XML only if `\@tempswatrue`.

```

1320   \if@tempswa
1321     \hyxmp@xmlify{#3}%

```

`\hyxmp@value` Store the XML-ified version of #3 in `\hyxmp@value` so we can reuse `\hyxmp@xmlified` if necessary.

```

1322   \let\hyxmp@value=\hyxmp@xmlified

```

```

1323 \hyxmp@add@to@xml{%
1324 -----<dc:#2>^^J%
1325 -----<rdf:Alt>^^J%
1326 }%

```

Record whether property #2 has definitions in multiple languages.

```

1327 \@if@def@and@nonempty{hyxmp@alt@#2}{%
1328 \hyxmp@multi@langstrue
1329 }{%
1330 \hyxmp@multi@langsfalse
1331 }%

```

There are now four cases to consider: the cross product of {pdfmetalang = “x-default”, pdfmetalang ≠ “x-default”} and {\XMPLangAlt was specified, \XMPLangAlt was not specified}. We handle each of these in turn.

```

1332 \ifx\@pdfmetalang\hyxmp@x@default
1333 \ifhyxmp@multi@langs

```

Case 1: No pdfmetalang but \XMPLangAlt. We consider this an error because the x-default language will not have a matching non-default language, in violation of the XMP specification’s guidance [5, p. 23]:

An **xml:lang** value of “x-default” may be used to explicitly denote a default item. If used, the “x-default” item shall be first in the array and its simple text value should be repeated in another item in which **xml:lang** specifies its actual language. However, an “x-default” item may be the only item, in which case there is only a default value in no defined language.

```

1334 \PackageError{hyperxmp}%
1335 {\string\XMPLangAlt\space was used without specifying
1336 pdfmetalang\MessageBreak
1337 or pdflang}%
1338 {Be sure to assign a language code to the pdfmetalang key and/or a
1339 document\MessageBreak
1340 language to the pdflang key (e.g., \string\hypersetup{pdfmetalang={en}}).}%
1341 \else

```

Case 2: No pdfmetalang and no \XMPLangAlt. Here we specify only x-default as the language, as per the guidance quoted above.

```

1342 \hyxmp@add@to@xml{%
1343 -----<rdf:li xml:lang="\hyxmp@x@default">\hyxmp@value</rdf:li>^^J%
1344 }%
1345 \fi
1346 \else
1347 \ifhyxmp@multi@langs

```

Case 3: Both pdfmetalang and \XMPLangAlt. In this case, we include an x-default followed by the pdfmetalang language, followed by all of the language alternatives.

```

1348 \hyxmp@xmlify{\@pdfmetalang}%
1349 \hyxmp@add@to@xml{%
1350 -----<rdf:li xml:lang="\hyxmp@x@default">\hyxmp@value</rdf:li>^^J%
1351 -----<rdf:li xml:lang="\hyxmp@xmlified">\hyxmp@value</rdf:li>^^J%
1352 }%
1353 \def\do##1##2{
1354 \hyxmp@xmlify{##2}%

```

```

1355     \hyxmp@add@to@xml{%
1356     -----<rdf:li xml:lang="##1">\hyxmp@xmlified</rdf:li>^^J%
1357     }%
1358     }%
1359     \csname hyxmp@alt@#2\endcsname
1360     \else

```

Case 4: pdfmetalang but no \XMPLangAlt. To reduce redundancy we omit the x-default and include the single language in which the text appears.

```

1361     \hyxmp@xmlify{\@pdfmetalang}%
1362     \hyxmp@add@to@xml{%
1363     -----<rdf:li xml:lang="\hyxmp@xmlified">\hyxmp@value</rdf:li>^^J%
1364     }%
1365     \fi
1366     \fi

```

Complete this XMP element.

```

1367     \hyxmp@add@to@xml{%
1368     -----</rdf:Alt>^^J%
1369     -----</dc:#2>^^J%
1370     }%
1371     \fi
1372 }%

```

`\hyxmp@list@to@xml` Given an optional `\if{something}` statement (#1), a Dublin Core property (#2), an RDF array (#3), and a macro containing a comma-separated list (#4), append the appropriate block of XML to the `\hyxmp@xml` macro.

```

1373 \newcommand*{\hyxmp@list@to@xml}[4][\iffalse]{%

```

Set `\@tempwatru` only if the given list is nonempty or the provided conditional evaluates to TRUE.

```

1374 \ifmtargexp{#4}{\@tempwafalse}{\@tempwatru}%
1375 #1
1376 \@tempwatru
1377 \fi

```

Append the corresponding XML only if `\@tempwatru`.

```

1378 \if@tempwa
1379 \hyxmp@add@to@xml{%
1380 -----<dc:#2>^^J%
1381 -----<rdf:#3>^^J%
1382 }%
1383 \bgroup

```

`\@elt` Re-encode the text from Unicode if necessary. Then redefine `\@elt` to XML-ify each element of the list and append it to `\hyxmp@xmlified`.

```

1384 \hyxmp@xmlify{#4}%
1385 \hyxmp@commas@to@list\hyxmp@list{\hyxmp@xmlified}%
1386 \def\@elt##1{%
1387 \hyxmp@add@to@xml{%
1388 -----<rdf:li>##1</rdf:li>^^J%
1389 }%
1390 }%
1391 \hyxmp@list
1392 \egroup

```



```

1393   \hyxmp@add@to@xml{%
1394   -----</rdf:#3>^^J%
1395   -----</dc:#2>^^J%
1396   }%
1397   \fi
1398 }

```

`\hyxmp@singleton@dc` Given an optional list type (Seq or Bag), a Dublin Core property, and a string, append a block of XML representing a one-element list consisting of the given string.

```

1399 \newcommand{\hyxmp@singleton@dc}[3][Bag]{%
1400   \ifnotmtargexp{#3}{%
1401     \hyxmp@xmlify{#3}%
1402     \hyxmp@add@to@xml{%
1403       -----<dc:#2>^^J%
1404       -----<rdf:#1>^^J%
1405       -----<rdf:li>\hyxmp@xmlified</rdf:li>^^J%
1406       -----</rdf:#1>^^J%
1407       -----</dc:#2>^^J%
1408     }%
1409   }
1410 }

```

`\hyxmp@cond@dc@identifier` Conditionally add a `dc:identifier` tag. Given a prefix string (#1) and a main string (#2), wrap these in a `dc:identifier` if the main string is nonempty and `\hyxmp@xmlified` is empty (implying the `dc:identifier` has not yet been written).

```

1411 \newcommand*{\hyxmp@cond@dc@identifier}[2]{%
1412   \ifx\hyxmp@xmlified\empty
1413     \ifnotmtargexp{#2}{%
1414       \hyxmp@add@simple@pfx{dc:identifier}{#1}{#2}%
1415     }%
1416   \fi
1417 }

```

`\hyxmp@dc@schema` Add properties defined by the Dublin Core schema to the `\hyxmp@xml` macro. Specifically, we add entries for the `dc:title` property if the author specified a `pdftitle`, the `dc:description` property if the author specified a `pdfsubject`, the `dc:rights` property if the author specified a `pdfcopyright`, the `dc:creator` property if the author specified a `pdfauthor`, the `dc:subject` property if the author specified `pdfkeywords`, the `dc:language` property if the author specified `pdflang`, the `dc:type` property if the author specified `pdftype`, and the `dc:identifier` if the author specified `pdfidentifier` or if we can derive it from other options. We also specify the `dc:source` property using the base name of the source file with `.tex` appended and the `dc:date` property using the date the document was run through L^AT_EX—unless the author specified `pdfdate`, in which case we use that.

```

1418 \newcommand*{\hyxmp@dc@schema}{%
1419   \hyxmp@add@simple{dc:format}{application/pdf}%
1420   \hyxmp@rdf@dc[\ifHy@pdfa]{title}{\@pdftitle}%
1421   \hyxmp@rdf@dc[\ifHy@pdfa]{description}{\@pdfsubject}%
1422   \hyxmp@rdf@dc{rights}{\@pdfcopyright}%
1423   \hyxmp@singleton@dc{publisher}{\@pdfpublisher}%
1424   \ifmtargexp{\@pdfdatetime}{%
1425     \hyxmp@singleton@dc[Seq]{date}{\hyxmp@today@xmp}%

```

```

1426 }{%
1427   \hyxmp@singleton@dc[Seq]{date}{\@pdfdatetime}%
1428 }%
1429 \hyxmp@singleton@dc{type}{\@pdfstype}%
1430 \hyxmp@list@to+xml[\ifHy@pdfa]{creator}{Seq}{\hyxmp@pdfauthor}%
1431 \hyxmp@list@to+xml{subject}{Bag}{\hyxmp@pdfkeywords}%
1432 \ifx\@pdfsource\@empty
1433 \else
1434   \hyxmp@add@simple{dc:source}{\@pdfsource}%
1435 \fi
1436 \hyxmp@list@to+xml{language}{Bag}{\hyxmp@dc@lang}%
1437 % If |\@pdfidentifier| is empty, try setting it to each of |\@pdfdoi|,
1438 % |\@pdfeissn|, |\@pdfissn|, and |\@pdfisbn|, in turn, with proper
1439 % syntactic adjustments.
1440 %   \begin{macrocode}
1441 \@ifmtargexp{\@pdfidentifier}{%
1442   \let\hyxmp@xmllified=\@empty
1443   \hyxmp@cond@dc@identifier{info:doi/}{\@pdfdoi}%
1444   \hyxmp@cond@dc@identifier{urn:ISSN:}{\@pdfeissn}%
1445   \hyxmp@cond@dc@identifier{urn:ISSN:}{\@pdfissn}%
1446   \hyxmp@cond@dc@identifier{urn:ISBN:}{\@pdfisbn}%
1447 }{%
1448   \hyxmp@add@simple{dc:identifier}{\@pdfidentifier}%
1449 }%
1450 }

```

3.6.4 The XMP Rights Management schema

`\hyxmp@xmpRights@schema` Add properties defined by the XMP Rights Management schema to the `\hyxmp@xml` macro. Currently, these are only the `xmpRights:Marked` property and the `xmpRights:WebStatement` property. If the author specified a copyright statement we mark the document as copyrighted. If the author specified a license statement we include the URL in the metadata.

```
1451 \newcommand*{\hyxmp@xmpRights@schema}{%
```

`\hyxmp@legal` Set `\hyxmp@rights` to YES if either `pdfcopyright` or `pdflicenseurl` was specified.

```

1452 \let\hyxmp@rights=\@empty
1453 \ifx\@pdflicenseurl\@empty
1454 \else
1455   \def\hyxmp@rights{YES}%
1456 \fi
1457 \ifx\@pdfcopyright\@empty
1458 \else
1459   \def\hyxmp@rights{YES}%
1460 \fi

```

Include the license-statement URL and/or the copyright indication. The copyright statement itself is included by `\hyxmp@dc@schema` in Section 3.6.3.

```

1461 \ifx\hyxmp@rights\@empty
1462 \else
1463   \ifx\@pdfcopyright\@empty
1464   \else
1465     \hyxmp@add@simple{xmpRights:Marked}{True}%

```

```

1466     \fi
1467     \hyxmp@add@simple{xmpRights:WebStatement}{\@pdflicenseurl}%
1468     \fi
1469 }

```

3.6.5 The XMP Media Management schema

`\hyxmp@aep@toks` Once we reach the end of the preamble and know that `\@pdftitle` and `\@pdfauthor` are no longer expected to change we use those macros (and others) to define one UUID for the document (`\hyxmp@DocumentID`) and one for the document instance (`\hyxmp@InstanceID`). As explained in Section 3.1, we defer the invocation of `\AtEndPreamble` to the end of the file.

```

1470 \expandafter\hyxmp@aep@toks\expandafter=\expandafter{%
1471   \the\hyxmp@aep@toks
1472   \AtEndPreamble{%
1473     \@ifmtargexp{\hyxmp@DocumentID}{\hyxmp@def@DocumentID}{}%
1474     \@ifmtargexp{\hyxmp@InstanceID}{\hyxmp@def@InstanceID}{}%
1475   }%
1476 }

```

`\hyxmp@mm@schema` Add properties defined by the XMP Media Management schema to the `\hyxmp+xml` macro. According to the XMP specification, the `xmpMM:DocumentID` property is supposed to uniquely identify a document, and the `xmpMM:InstanceID` property is supposed to change with each save operation [5]. As seen in Section 3.5, we do what we can to honor this intention from within a T_EX-based workflow. We additionally support the `xmpMM:VersionID` property, whose value is supplied by the author using `pdfversionid`.

```

1477 \gdef\hyxmp@mm@schema{%
1478   \hyxmp@add@simple{xmpMM:DocumentID}{\hyxmp@DocumentID}%
1479   \hyxmp@add@simple{xmpMM:InstanceID}{\hyxmp@InstanceID}%
1480   \hyxmp@add@simple{xmpMM:VersionID}{\@pdfversionid}%
1481   \hyxmp@add@simple{xmpMM:RenditionClass}{\@pdfrendition}%
1482 }

```

3.6.6 The XMP Basic schema

`\hyxmp@xmp@basic@schema` Add properties defined by the XMP Basic schema to the `\hyxmp+xml` macro. These include a bunch of dates (all set to the same value) and the base URL for the document if specified with `baseurl`.

```

1483 \newcommand*{\hyxmp@xmp@basic@schema}{%

```

For the document's creation date, use the user-specified `\@pdfcreationdate` if defined and non-empty. Otherwise use our fabricated `\hyxmp@today@xmp`.

```

1484   \@ifmtargexp{\@pdfcreationdate}{%
1485     \hyxmp@add@simple{xmp:CreateDate}{\hyxmp@today@xmp}%
1486   }{%
1487     \hyxmp@add@simple{xmp:CreateDate}{%
1488       \expandafter\hyxmp@as@xmp@date\expandafter{\@pdfcreationdate}}%
1489   }%

```

For the document’s modification date, use the user-specified `\@pdfmoddate` if defined and non-empty. Otherwise use our fabricated `\hyxmp@today@xmp`.

```

1490 \@ifmtargexp{\@pdfmoddate}{%
1491   \hyxmp@add@simple{xmp:ModifyDate}{\hyxmp@today@xmp}%
1492 }{%
1493   \hyxmp@add@simple{xmp:ModifyDate}{%
1494     \expandafter\hyxmp@as@xmp@date\expandafter{\@pdfmoddate}}%
1495 }%
```

For the document’s metadata date, use the user-specified `\@pdfmetadatetime` if defined and non-empty. Otherwise use our fabricated `\hyxmp@today@xmp`.

```

1496 \@ifmtargexp{\@pdfmetadatetime}{%
1497   \hyxmp@add@simple{xmp:MetadataDate}{\hyxmp@today@xmp}%
1498 }{%
1499   \hyxmp@add@simple{xmp:MetadataDate}{\@pdfmetadatetime}%
1500 }%
```

Define the creation tool and the base URL.

```

1501 \hyxmp@add@simple{xmp:CreatorTool}{\@pdfcreator}%
1502 \hyxmp@add@simple{xmp:BaseURL}{\@baseurl}%
1503 }
```

3.6.7 The Photoshop schema

`\hyxmp@photoshop@schema` Add properties defined by the Photoshop schema to the `\hyxmp@xml` macro. We
`\hyxmp@photoshop@data` currently support only the `photoshop:AuthorsPosition` and `photoshop:CaptionWriter` properties.

```

1504 \gdef\hyxmp@photoshop@schema{%
1505   \edef\hyxmp@photoshop@data{\@pdfauthortitle\@pdfcaptionwriter}%
1506   \hyxmp@add@simple{photoshop:AuthorsPosition}{\@pdfauthortitle}%
1507   \hyxmp@add@simple{photoshop:CaptionWriter}{\@pdfcaptionwriter}%
1508 }
```

3.6.8 PDF/* Identification schemata

`\hyxmp@pdfa@id@schema` Add properties defined by the PDF/A Identification schema [13] to the `\hyxmp@xml` macro. These properties identify a document as conforming to a particular PDF/A standard. We default to PDF/A-1b if any PDF/A compliance is detected but let the author override the “1” with `pdfapart` and the “b” with `pdfaconformance`.

```

1509 \newcommand*\hyxmp@pdfa@id@schema{%
1510   \ifHy@pdfa
1511     \hyxmp@add@simple{pdfaid:part}{\@pdfapart}%
1512     \hyxmp@add@simple{pdfaid:conformance}{\@pdfaconformance}%
1513   \fi
1514 }
```

`\hyxmp@pdfua@id@schema` If the document conforms to a PDF/UA standard, the author can indicate the standard version with `pdfuapart`.

```

1515 \newcommand*\hyxmp@pdfua@id@schema{%
1516   \hyxmp@add@simple{pdfuaid:part}{\@pdfuapart}%
1517 }
```

`\hyxmp@pdfx@id@schema` If the document conforms to a PDF/X standard, the author can indicate the standard version with `pdfxstandard`. We separately handle PDF/X-1, PDF/X-2 and PDF/X-3, and PDF/X-4 onwards.

```

1518 \newcommand*{\hyxmp@pdfx@id@schema}{%
1519   \@hyxmp@count=0\hyxmp@pdfx@major\relax
1520   \ifnum\@hyxmp@count=0
1521     \else
1522       \ifnum\@hyxmp@count=1
1523         \hyxmp@add@simple{pdfx:GTS_PDFXVersion}{PDF/X-1:2001}%
1524         \hyxmp@add@simple{pdfx:GTS_PDFXConformance}{\@pdfxstandard}%
1525       \else
1526         \ifnum\@hyxmp@count<4
1527           \hyxmp@add@simple{pdfx:GTS_PDFXVersion}{\@pdfxstandard}%
1528         \else
1529           \hyxmp@add@simple{pdfxid:GTS_PDFXVersion}{\@pdfxstandard}%
1530         \fi
1531       \fi
1532     \fi
1533 }

```

3.6.9 The IPTC Photo Metadata schema

`\xmplinesep` Lines in multiline fields are separated by `\xmplinesep` in the generated XML. This defaults to an LF (`^^J`) character but written as an XML character entity for consistency across operating systems.

```

1534 \begingroup
1535   \catcode'\&=12
1536   \catcode'\#=12
1537   \gdef\xmplinesep{&#xA;}
1538 \endgroup

```

`\hyxmp@list@to@lines` Given a property (`#1`) and a macro containing a comma-separated list (`#2`), replace commas with `\xmplinesep`. Do nothing if the list is empty.

```

1539 \newcommand*{\hyxmp@list@to@lines}[2]{%
1540   \@ifnotmtargexp{#2}{%
1541     \bgroup
1542     \hyxmp@add@to+xml{%
1543       \hyxmp@extra@indent_____<#1>%
1544     }%

```

`\@elt@first` The first element of the list is output as is.

```

1545   \def\@elt@first##1{%
1546     \hyxmp@add@to+xml{##1}%
1547     \let\@elt=\@elt@rest
1548   }%

```

`\@elt@rest` The remaining elements of the list are output with a preceding line separator (`\xmplinesep`).

```

1549   \def\@elt@rest##1{%
1550     \hyxmp@add@to+xml{\xmplinesep##1}%
1551   }%

```

`\@elt` Re-encode the text from Unicode if necessary. Then redefine `\@elt` to insert a line separator between terms.

```
1552     \let\@elt=\@elt@first
1553     \hyxmp@xmlify{#2}%
1554     \hyxmp@commas@to@list\hyxmp@list{\hyxmp@xmlified}%
1555     \hyxmp@list
1556     \hyxmp@add@to@xml{</#1>^^J}%
1557   \egroup
1558 }%
1559 }
```

`\hyxmp@iptc@schema` Add properties defined by the IPTC Photo Metadata schema [10] to the `\hyxmp@xml` macro. We currently support only the `lptc4xmpCore:CreatorContactInfo` property, although this is a structure containing multiple fields.

```
1560 \gdef\hyxmp@iptc@schema{%
```

Because we currently support only `lptc4xmpCore:CreatorContactInfo` it suffices to check if we have any relevant data. If so, we instantiate a `lptc4xmpCore:ContactInfo` structure with all available fields.

```
1561   \ifx\hyxmp@iptc@data\@empty
1562   \else
1563     \hyxmp@add@to@xml{%
1564     -----<Iptc4xmpCore:CreatorContactInfo rdf:parseType="Resource">^^J%
1565     }%
```

We locally redefine `\hyxmp@extra@indent` to increase the indentation of the assignments to `lptc4xmpCore:CreatorContactInfo`'s fields.

```
1566   \bgroup
1567   \edef\hyxmp@extra@indent{\hyxmp@extra@indent\space\space}%
1568   \hyxmp@list@to@lines{Iptc4xmpCore:CIAdrExtadr}{\@pdfcontactaddress}%
1569   \hyxmp@add@simple{Iptc4xmpCore:CIAdrCity}{\@pdfcontactcity}%
1570   \hyxmp@add@simple{Iptc4xmpCore:CIAdrRegion}{\@pdfcontactregion}%
1571   \hyxmp@add@simple{Iptc4xmpCore:CIAdrPcode}{\@pdfcontactpostcode}%
1572   \hyxmp@add@simple{Iptc4xmpCore:CIAdrCtry}{\@pdfcontactcountry}%
```

`\xmplinesep` The IPTC standard states that sets of telephone numbers, email addresses, and URLs for the contact person or institution, “[m]ay have to be separated by a comma in the user interface” [10]. This is rather ambiguous: Does the comma appear *only* in the user interface or also in the generated XML? Here we assume the latter interpretation and temporarily redefine `\xmplinesep` as a comma and use `\hyxmp@list@to@lines` to insert the data. Unlike `\hyxmp@add@simple`, this approach trims all spaces surrounding commas.

```
1573     \def\xmplinesep{,%}
1574     \hyxmp@list@to@lines{Iptc4xmpCore:CI TelWork}{\@pdfcontactphone}%
1575     \hyxmp@list@to@lines{Iptc4xmpCore:CI EmailWork}{\@pdfcontactemail}%
1576     \hyxmp@list@to@lines{Iptc4xmpCore:CI UrlWork}{\@pdfcontacturl}%
1577   \egroup
1578   \hyxmp@add@to@xml{%
1579   -----</Iptc4xmpCore:CreatorContactInfo>^^J%
1580   }%
1581   \fi
1582 }
```

3.6.10 The PRISM Basic Metadata schema

`\hyxmp@prism@schema` Add properties defined by the PRISM Basic Metadata schema [8].

```
1583 \newcommand*{\hyxmp@prism@schema}{%
1584   \ifx\hyxmp@prism@data\empty
1585   \else
1586     \hyxmp@add@simple{prism:complianceProfile}{three}%
1587   \fi
1588   \hyxmp@add@simple@lang{prism:subtitle}{\@pdfsubtitle}%
1589   \hyxmp@add@simple@lang{prism:publicationName}{\@pdfpublication}%
1590   \hyxmp@add@simple{prism:aggregationType}{\@pdfpubtype}%
1591   \hyxmp@add@simple@lang{prism:bookEdition}{\@pdfbookedition}%
1592   \hyxmp@add@simple{prism:volume}{\@pdfvolumenum}%
1593   \hyxmp@add@simple{prism:number}{\@pdfissuenum}%
1594   \hyxmp@add@simple{prism:pageRange}{\@pdfpagerange}%
1595   \hyxmp@add@simple{prism:isbn}{\@pdfisbn}%
1596   \hyxmp@add@simple{prism:issn}{\@pdfissn}%
1597   \hyxmp@add@simple{prism:eIssn}{\@pdfeissn}%
1598   \hyxmp@add@simple{prism:doi}{\@pdfdoi}%
1599   \hyxmp@add@simple{prism:url}{\@pdfurl}%
1600   \hyxmp@add@simple{prism:byteCount}{\@pdfbytes}%
1601   \hyxmp@add@simple{prism:pageCount}{\@pdfnumpages}%
1602 }
```

3.6.11 The Journal Article Versions (JAV) schema

`\hyxmp@jav@schema` Add properties defined by the NISO/ALPSP Journal Article Versions schema [1].

```
1603 \newcommand*{\hyxmp@jav@schema}{%
1604   \hyxmp@add@simple{jav:journal_article_version}{\@pdfpubstatus}%
1605 }
```

3.6.12 The XMP Paged-Text schema

`\hyxmp@xmptpg@schema` The XMP Paged-Text schema [5] includes properties related to the construction of the PDF file itself. We acquire most of this information through LuaTeX mechanisms and therefore include much less information when run from other TeX engines.

```
1606 \newcommand*{\hyxmp@xmptpg@schema}{%
1607   \ifLuaTeX
1608     \luadirect{write_xmp_font_list(\the\hyxmp@cct)}%
1609   \fi
1610   \hyxmp@add@simple{xmpTPg:NPages}{\@pdfnumpages}%
1611 }
```

`\hyxmp@cct` We store the current category-code table to ensure that `write_xmp_font_list`'s output uses our redefined category codes.

```
1612 \ifLuaTeX
1613   \newcatcodetable\hyxmp@cct
1614   \savecatcodetable\hyxmp@cct
1615 \fi
```

`\hyxmp@prot@us` Define an underscore character that's protected from being converted into a space when passed to `\hyxmp@add@to@xml`. `\hyxmp@prot@us` is used within

`write_xmp_font_list` (below) in particular to typeset filenames that may contain underscores.

```

1616 \bgroup
1617 \catcode'\_ =11
1618 \gdef\hyxmp@prot@us{_%}
1619 \egroup

```

Here we define a Lua function, `write_xmp_font_list`, that writes font information to the XMP packet.

```

1620 \ifLuaTeX
1621 \begin{luacode*}
1622 function write_xmp_font_list (cct)
1623   local function show_field(name, ...)
1624     for i = 1, select("#", ...) do
1625       local val = select(i, ...)
1626       if val then
1627         local xml = string.gsub(val, "&", "&amp;")
1628         xml = string.gsub(xml, "<", "&lt;")
1629         xml = string.gsub(xml, ">", "&gt;")
1630         xml = string.gsub(xml, "_", "\\hyxmp@prot@us ")
1631         tex.print(cct, "_____<stFnt:" .. name .. ">" ..
1632                   xml .. "</stFnt:" .. name .. ">^^J%")
1633       return
1634     end
1635   end
1636 end
1637 tex.print(cct, "\\hyxmp@add@to@xml{%}")
1638 tex.print(cct, "_____<xmpTPg:Fonts>^^J%")
1639 tex.print(cct, "_____<rdf:Bag>^^J%")
1640 for i, f in font.each() do
1641   tex.print(cct, "_____<rdf:li rdf:parseType=\"Resource\">^^J%")
1642   if f.filename then
1643     local fname = string.gsub(f.filename, "^harfloaded:(.*)", "%1")
1644     local info = fontloader.info(fname)
1645     if info then
1646       show_field("fontFace", info.fullname)
1647       show_field("fontFamily", info.familyname)
1648       show_field("fontName", info.fontname)
1649       show_field("versionString", info.version)
1650     end
1651     local baseName = string.gsub(f.filename, ".*[/\\](.*)", "%1")
1652     show_field("fontFileName", baseName)
1653   else
1654     show_field("fontName", f.psname, f.fullname, f.name)
1655   end
1656   if f.format and f.format ~= "unknown" then
1657     show_field("fontType", f.format)
1658   end
1659   tex.print(cct, "_____</rdf:li>^^J%")
1660 end
1661 tex.print(cct, "_____</rdf:Bag>^^J%")
1662 tex.print(cct, "_____</xmpTPg:Fonts>^^J%")
1663 tex.print(cct, "}")
1664 end

```



```

1665 \end{luacode*}
1666 \fi

```

3.6.13 XMP extension schemata

Not all of the schemata supported by hyperxmp are predefined by XMP. PDF/A conversion would normally fail for documents that employ “custom” schemata. However, this problem can be circumvented by declaring non-standard schemata in the XMP packet itself, following a technique described in a PDF Association technical note [14]. In this section, we declare only those schemata we actually use.

`\hyxmp@check@iptc@data` Define `\hyxmp@iptc@data` as the concatenation of all IPTC photo metadata supplied by the document.

```

1667 \newcommand*{\hyxmp@check@iptc@data}{%
1668 \edef\hyxmp@iptc@data{%
1669 \pdfcontactaddress
1670 \pdfcontactcity
1671 \pdfcontactregion
1672 \pdfcontactpostcode
1673 \pdfcontactcountry
1674 \pdfcontactphone
1675 \pdfcontactemail
1676 \pdfcontacturl
1677 }%
1678 }%

```

`\hyxmp@check@prism@data` Define `\hyxmp@prism@data` as the concatenation of all PRISM metadata supplied by the document.

```

1679 \newcommand*{\hyxmp@check@prism@data}{%
1680 \edef\hyxmp@prism@data{%
1681 \pdfbookedition
1682 \pdfbytes
1683 \pdfdoi
1684 \pdfeissn
1685 \pdfisbn
1686 \pdfissn
1687 \pdfissuenum
1688 \pdfnumpages
1689 \pdfpagerange
1690 \pdfpublication
1691 \pdfpubtype
1692 \pdfsubtitle
1693 \pdfurl
1694 \pdfvolumenum
1695 }%
1696 }%

```

`\hyxmp@check@jav@data` Define `\hyxmp@jav@data` as the concatenation of all JAV metadata supplied by the document.

```

1697 \newcommand*{\hyxmp@check@jav@data}{%
1698 \edef\hyxmp@jav@data{%
1699 \pdfpubstatus
1700 }%

```

1701 }

`\hyxmp@begin@extension@decls` Begin a block of XML tags that indicates we're declaring one or more extension schemata.

```
1702 \newcommand*{\hyxmp@begin@extension@decls}{%
1703   \hyxmp@add@to@xml{%
1704     <pdfaExtension:schemas>^^J%
1705     <rdf:Bag>^^J%
1706   }%
1707 }
```

`\hyxmp@end@extension@decls` End the block of XML tags begun by `\hyxmp@begin@extension@decls`.

```
1708 \newcommand*{\hyxmp@end@extension@decls}{%
1709   \hyxmp@add@to@xml{%
1710     </rdf:Bag>^^J%
1711     </pdfaExtension:schemas>^^J%
1712   }%
1713 }
```

`\hyxmp@begin@ext@decl` Begin the declaration of a single extension schema. `\hyxmp@begin@ext@decl` accepts the schema's name, prefix, and namespace URI.

```
1714 \newcommand*{\hyxmp@begin@ext@decl}[3]{%
1715   \hyxmp@add@to@xml{%
1716     <rdf:li rdf:parseType="Resource">^^J%
1717     <pdfaSchema:schema>#1</pdfaSchema:schema>^^J%
1718     <pdfaSchema:prefix>#2</pdfaSchema:prefix>^^J%
1719     <pdfaSchema:namespaceURI>#3</pdfaSchema:namespaceURI>^^J%
1720     <pdfaSchema:property>^^J%
1721     <rdf:Seq>^^J%
1722   }%
1723 }
```

`\hyxmp@end@ext@decl` End the declaration of a single extension schema.

```
1724 \newcommand*{\hyxmp@end@ext@decl}{%
1725   \hyxmp@add@to@xml{%
1726     </rdf:Seq>^^J%
1727     </pdfaSchema:property>^^J%
1728     </rdf:li>^^J%
1729   }%
1730 }
```

`\hyxmp@declare@property` Declare a single extension-schema property. `\hyxmp@declare@property` takes as input an optional type (defaults to Text) and a mandatory name, category, and description.

```
1731 \newcommand{\hyxmp@declare@property}[4][Text]{%
1732   \hyxmp@add@to@xml{%
1733     <rdf:li rdf:parseType="Resource">^^J%
1734     <pdfaProperty:name>}%
1735     \xdef\hyxmp@xml{\hyxmp@xml#2}%
1736     \hyxmp@add@to@xml{</pdfaProperty:name>^^J%
1737     <pdfaProperty:valueType>#1</pdfaProperty:valueType>^^J%
1738     <pdfaProperty:category>#3</pdfaProperty:category>^^J%
1739     <pdfaProperty:description>#4</pdfaProperty:description>^^J%
```

```

1740 -----</rdf:li>^^J%
1741 }%
1742 }%

```

`\hyxmp@declare@field` Declare a single field in a custom datatype required by an extension schema. `\hyxmp@declare@field` takes as input an optional type (defaults to Text) and a mandatory name and description.

```

1743 \newcommand{\hyxmp@declare@field}[3][Text]{%
1744   \hyxmp@add@to+xml{%
1745     -----<rdf:li rdf:parseType="Resource">^^J%
1746     -----<pdfaField:name>#2</pdfaField:name>^^J%
1747     -----<pdfaField:valueType>#1</pdfaField:valueType>^^J%
1748     -----<pdfaField:description>#3</pdfaField:description>^^J%
1749     -----</rdf:li>^^J%
1750   }%
1751 }

```

`\hyxmp@pdf@extensions` Declare the Adobe PDF schema.

```

1752 \newcommand*{\hyxmp@pdf@extensions}{%
1753   \hyxmp@begin@ext@decl
1754     {Adobe PDF Schema}%
1755     {pdf}%
1756     {http://ns.adobe.com/pdf/1.3/}%
1757   \hyxmp@declare@property
1758     {Trapped}%
1759     {internal}%
1760     {Indication if the document has been modified to include trapping information}%
1761   \hyxmp@end@ext@decl
1762 }%

```

`\hyxmp@mm@extensions` Declare the XMP Media Management schema.

```

1763 \newcommand*{\hyxmp@mm@extensions}{%
1764   \hyxmp@begin@ext@decl
1765     {XMP Media Management Schema}%
1766     {xmpMM}%
1767     {http://ns.adobe.com/xap/1.0/mm/}%
1768   \hyxmp@declare@property
1769     [URI]
1770     {DocumentID}%
1771     {internal}%
1772     {UUID based identifier for all versions and renditions of a document}%
1773   \hyxmp@declare@property
1774     [URI]
1775     {InstanceID}%
1776     {internal}%
1777     {UUID based identifier for specific incarnation of a document}%
1778   \hyxmp@declare@property
1779     {VersionID}%
1780     {internal}%
1781     {Document version identifier}%
1782   \hyxmp@declare@property
1783     [RenditionClass]%
1784     {RenditionClass}%
1785     {internal}%

```

```

1786         {The manner in which a document is rendered}%
1787 \hyxmp@end@ext@decl
1788 }%

```

`\hyxmp@pdfa@id@extensions` Declare the PDF/A Identification schema [13].

```

1789 \newcommand*{\hyxmp@pdfa@id@extensions}{%
1790 \hyxmp@begin@ext@decl
1791     {PDF/A Identification Schema}%
1792     {pdfaid}%
1793     {http://www.aiim.org/pdfa/ns/id/}%
1794 \hyxmp@declare@property
1795     [Integer]%
1796     {part}%
1797     {internal}%
1798     {Part of PDF/A standard}%
1799 \hyxmp@declare@property
1800     {conformance}%
1801     {internal}%
1802     {Conformance level of PDF/A standard}%
1803 \hyxmp@end@ext@decl
1804 }%

```

`\hyxmp@pdfua@id@extensions` Declare the PDF/UA Universal Accessibility schema.

```

1805 \newcommand*{\hyxmp@pdfua@id@extensions}{%
1806 \hyxmp@begin@ext@decl
1807     {PDF/UA Universal Accessibility Schema}%
1808     {pdfuaid}%
1809     {http://www.aiim.org/pdfua/ns/id/}%
1810 \hyxmp@declare@property
1811     [Integer]%
1812     {part}%
1813     {internal}%
1814     {Part of ISO 14289 standard}%
1815 \hyxmp@end@ext@decl
1816 }%

```

`\hyxmp@pdfx@id@extensions` Declare the schema used pre-PDF/X-4. Because Adobe Acrobat DC (at least) defines this even for PDF/X-4 and later, we follow suit.

```

1817 \newcommand*{\hyxmp@pdfx@id@extensions}{%
1818 \ifx\hyxmp@pdfx@major\empty
1819 \else
1820 \hyxmp@begin@ext@decl
1821     {Adobe Document Info PDF/X eXtension Schema}%
1822     {pdfx}%
1823     {http://ns.adobe.com/pdfx/1.3/}%
1824 \hyxmp@declare@property
1825     {GTS_PDFXVersion}%
1826     {internal}%
1827     {ID of PDF/X standard}%
1828 \hyxmp@declare@property
1829     {GTS_PDFXConformance}%
1830     {internal}%
1831     {Conformance level of PDF/X standard}%
1832 \hyxmp@end@ext@decl

```

```

1833 \fi
Declare the schema used in PDF/X-4 and later versions.
1834 \@hyxmp@count=0\hyxmp@pdfx@major\relax
1835 \ifnum\@hyxmp@count>3
1836   \hyxmp@begin@ext@decl
1837     {PDF/X ID Schema}%
1838     {pdfxid}%
1839     {http://www.npes.org/pdfx/ns/id/}%
1840   \hyxmp@declare@property
1841     {GTS_PDFXVersion}%
1842     {internal}%
1843     {ID of PDF/X standard}%
1844   \hyxmp@end@ext@decl
1845 \fi
1846 }%

```

`\hyxmp@iptc@extensions` Because IPTC metadata are not recognized by the PDF/A standard, PDF/A conversion would normally fail for documents that utilize IPTC metadata. Declaring the IPTC metadata we support enables the document to be converted to PDF/A format.

```

1847 \newcommand*{\hyxmp@iptc@extensions}{%
1848   \hyxmp@begin@ext@decl
1849     {IPTC Core Schema}%
1850     {Iptc4xmpCore}%
1851     {http://iptc.org/std/Iptc4xmpCore/1.0/xmlns/}%
1852   \hyxmp@declare@property
1853     [ContactInfo]
1854     {CreatorContactInfo}
1855     {external}
1856     {Document creator's contact information}

```

We can't call `\hyxmp@end@ext@decl` because we need first need to define the `Iptc4xmpCore:ContactInfo` structure.

```

1857   \hyxmp@add@to+xml{%
1858     _____</rdf:Seq>^^J%
1859     _____</pdfaSchema:property>^^J%
1860     _____<pdfaSchema:valueType>^^J%
1861     _____<rdf:Seq>^^J%
1862     _____<rdf:li rdf:parseType="Resource">^^J%
1863     _____<pdfaType:type>ContactInfo</pdfaType:type>^^J%
1864     _____<pdfaType:namespaceURI>http://iptc.org/std/Iptc4xmpCore/1.0/xmlns/</pdfaTy
1865     _____<pdfaType:prefix>Iptc4xmpCore</pdfaType:prefix>^^J%
1866     _____<pdfaType:description>%
1867         Basic set of information to get in contact with a person%
1868         </pdfaType:description>^^J%
1869     _____<pdfaType:field>^^J%
1870     _____<rdf:Seq>^^J%
1871   }%
1872   \hyxmp@declare@field
1873     {CiAdrCity}%
1874     {Contact information city}%
1875   \hyxmp@declare@field
1876     {CiAdrCtry}%

```

```

1877     {Contact information country}%
1878 \hyxmp@declare@field
1879     {CiAdrExtadr}%
1880     {Contact information address}%
1881 \hyxmp@declare@field
1882     {CiAdrPcode}%
1883     {Contact information local postal code}%
1884 \hyxmp@declare@field
1885     {CiAdrRegion}%
1886     {Contact information regional information such as state or province}%
1887 \hyxmp@declare@field
1888     {CiEmailWork}%
1889     {Contact information email address(es)}%
1890 \hyxmp@declare@field
1891     {CiTelWork}%
1892     {Contact information telephone number(s)}%
1893 \hyxmp@declare@field
1894     {CiUrlWork}%
1895     {Contact information Web URL(s)}%
1896 \hyxmp@add@to+xml{%
1897 -----</rdf:Seq>^^J%
1898 -----</pdfaType:field>^^J%
1899 -----</rdf:li>^^J%
1900 -----</rdf:Seq>^^J%
1901 -----</pdfaSchema:valueType>^^J%
1902 -----</rdf:li>^^J%
1903 }%
1904 }

```

\hyxmp@prism@extensions Because PRISM metadata are not recognized by the PDF/A standard, PDF/A conversion would normally fail for documents that utilize PRISM metadata. Declaring the PRISM metadata we support enables the document to be converted to PDF/A format.

```

1905 \newcommand*{\hyxmp@prism@extensions}{%
1906 \hyxmp@begin@ext@decl
1907     {PRISM Basic Metadata}%
1908     {prism}%
1909     {http://prismstandard.org/namespaces/basic/3.0/}%
1910 \hyxmp@declare@property
1911     {complianceProfile}%
1912     {internal}%
1913     {PRISM specification compliance profile to which this document adheres}%
1914 \hyxmp@declare@property
1915     {publicationName}%
1916     {external}%
1917     {Publication name}%
1918 \hyxmp@declare@property
1919     {aggregationType}%
1920     {external}%
1921     {Publication type}%
1922 \hyxmp@declare@property
1923     {bookEdition}%
1924     {external}%
1925     {Edition of the book in which the document was published}%

```

```

1926 \hyxmp@declare@property
1927     {volume}%
1928     {external}%
1929     {Publication volume number}%
1930 \hyxmp@declare@property
1931     {number}%
1932     {external}%
1933     {Publication issue number within a volume}%
1934 \hyxmp@declare@property
1935     {pageRange}%
1936     {external}%
1937     {Page range for the document within the print version of its publication}%
1938 \hyxmp@declare@property
1939     {issn}%
1940     {external}%
1941     {ISSN for the printed publication in which the document was published}%
1942 \hyxmp@declare@property
1943     {eIssn}%
1944     {external}%
1945     {ISSN for the electronic publication in which the document was published}%
1946 \hyxmp@declare@property
1947     {isbn}%
1948     {external}%
1949     {ISBN for the publication in which the document was published}%
1950 \hyxmp@declare@property
1951     {doi}%
1952     {external}%
1953     {Digital Object Identifier for the document}%
1954 \hyxmp@declare@property
1955     [URL]
1956     {url}%
1957     {external}%
1958     {URL at which the document can be found}%
1959 \hyxmp@declare@property
1960     [Integer]
1961     {byteCount}%
1962     {internal}%
1963     {Approximate file size in octets}%
1964 \hyxmp@declare@property
1965     [Integer]
1966     {pageCount}%
1967     {internal}%
1968     {Number of pages in the print version of the document}%
1969 \hyxmp@declare@property
1970     {subtitle}%
1971     {external}%
1972     {Document's subtitle}%
1973 \hyxmp@end@ext@decl
1974 }%

```

\hyxmp@jav@extensions Because JAV metadata are not recognized by the PDF/A standard, PDF/A conversion would normally fail for documents that utilize JAV metadata. Declaring the JAV metadata we support enables the document to be converted to PDF/A format.

```

1975 \newcommand*{\hyxmp@jav@extensions}{%

```

```

1976 \hyxmp@begin@ext@decl
1977     {NISO/ALPSP Journal Article Versions}%
1978     {jav}%
1979     {http://www.niso.org/schemas/jav/1.0/}%
1980 \hyxmp@declare@property
1981     [Closed Choice of Text]%
1982     {journal_article_version}%
1983     {external}%
1984     {Article status, one of "AO", "SMUR", "AM", "P", "VoR", "CVoR", or "EVoR"}%
1985 \hyxmp@end@ext@decl
1986 }%

```

`\hyxmp@declare@extensions` Declare all XMP extension schemata. We'll always have at least one, the XMP Media Management extensions, because we automatically generate `xmpMM:DocumentID` and `xmpMM:InstanceID` values.

```

1987 \newcommand*{\hyxmp@declare@extensions}{%
1988   \hyxmp@begin@extension@decls

```

Declare the Adobe PDF schema (always present).

```
1989   \hyxmp@pdf@extensions
```

Declare the XMP Media Management extensions (always present).

```
1990   \hyxmp@mm@extensions
```

Declare the PDF/A Identification extensions, but only when generating a PDF/A document.

```

1991   \ifHy@pdfa
1992     \hyxmp@pdfa@id@extensions
1993   \fi

```

Conditionally declare the PDF/UA Universal Accessibility extensions.

```

1994   \ifx\@pdfuapart\@empty
1995   \else
1996     \hyxmp@pdfua@id@extensions
1997   \fi

```

`\next` Conditionally declare the PDF/X extensions.

```

1998   \ifx\@pdfxversion\@empty
1999   \else
2000     \hyxmp@pdfx@id@extensions
2001   \fi

```

Conditionally declare IPTC photo metadata extensions.

```

2002   \ifx\hyxmp@iptc@data\@empty
2003   \else
2004     \hyxmp@iptc@extensions
2005   \fi

```

Conditionally declare PRISM basic metadata extensions.

```

2006   \ifx\hyxmp@prism@data\@empty
2007   \else
2008     \hyxmp@prism@extensions
2009   \fi

```


Conditionally declare JAV metadata.

```
2010 \ifx\hyxmp@jav@data\@empty
2011 \else
2012 \hyxmp@jav@extensions
2013 \fi
2014 \hyxmp@end@extension@decls
2015 }
```

3.6.14 Combining schemata into an XMP packet

`\hyxmp@bom` Define a macro for the Unicode byte-order marker (BOM).

```
2016 \begingroup
2017 \ifhyxmp@unicodetex
2018 \lccode'\!="FEFF %
2019 \lowercase{%
2020 \gdef\hyxmp@bom{!}
2021 }%
2022 \else
2023 \catcode'\^^ef=12
2024 \catcode'\^^bb=12
2025 \catcode'\^^bf=12
2026 \gdef\hyxmp@bom{\^^ef^^bb^^bf}%
2027 \fi
2028 \endgroup
```

`\hyxmp@construct@packet` Successively add XML data to `\hyxmp+xml` until we have something we can insert `\hyxmp+xml` into the document's PDF catalog.

```
2029 \def\hyxmp@construct@packet{%
2030 \gdef\hyxmp+xml{}%
2031 \hyxmp@add@to+xml{<?xpacket begin="\hyxmp@bom" %
2032 id="W5M0MpCehiHzreSzNTczkc9d" ?>^^J%
2033 <x:xmpmeta xmlns:x="adobe:ns:meta/">^^J%
2034 __<rdf:RDF %
2035 xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns\hyxmp@hash">^^J%
2036 ___<rdf:Description rdf:about="">^^J%
```

Specify every namespace we can potentially use, even the ones we end up not actually using.

```
2037 _____xmlns:pdf="http://ns.adobe.com/pdf/1.3/"^^J%
2038 _____xmlns:xmpRights="http://ns.adobe.com/xap/1.0/rights/"^^J%
2039 _____xmlns:dc="http://purl.org/dc/elements/1.1/"^^J%
2040 _____xmlns:photoshop="http://ns.adobe.com/photoshop/1.0/"^^J%
2041 _____xmlns:xmp="http://ns.adobe.com/xap/1.0/"^^J%
2042 _____xmlns:xmpMM="http://ns.adobe.com/xap/1.0/mm/"^^J%
2043 _____xmlns:stEvt="http://ns.adobe.com/xap/1.0/sType/ResourceEvent\hyxmp@hash"^^J%
2044 _____xmlns:pdfaid="http://www.aiim.org/pdfa/ns/id/"^^J%
2045 _____xmlns:pdfuaid="http://www.aiim.org/pdfua/ns/id/"^^J%
2046 _____xmlns:pdfx="http://ns.adobe.com/pdfx/1.3/"^^J%
2047 }%
```

We make one exception to the rule of including every namespace we can potentially use: We don't define the `pdfxid` namespace unless the PDF/X version (specified by the `pdfxstandard`) option is 4 or greater. Otherwise, Adobe Acrobat—at least

Adobe Acrobat DC 2020—alters the way it displays color. (I believe it renders color in a printer gamut instead of a screen gamut.)

```
2048 \ifnum0\hyxmp@pdfx@major>3
2049   \hyxmp@add@to+xml{%
2050 -----xmlns:pdfxid="http://www.npes.org/pdfx/ns/id/"^^J%
2051   }%
2052 \fi
```

Revert to “include every namespace” mode.

```
2053 \hyxmp@add@to+xml{%
2054 -----xmlns:prism="http://prismstandard.org/namespaces/basic/3.0/"^^J%
2055 -----xmlns:jav="http://www.niso.org/schemas/jav/1.0/"^^J%
2056 -----xmlns:xmpTPg="http://ns.adobe.com/xap/1.0/t/pg/"^^J%
2057 -----xmlns:stFnt="http://ns.adobe.com/xap/1.0/sType/Font\hyxmp@hash"^^J%
2058 -----xmlns:Iptc4xmpCore="http://iptc.org/std/Iptc4xmpCore/1.0/xmlns/"^^J%
2059 -----xmlns:pdfaExtension="http://www.aiim.org/pdfa/ns/extension/"^^J%
2060 -----xmlns:pdfaSchema="http://www.aiim.org/pdfa/ns/schema\hyxmp@hash"^^J%
2061 -----xmlns:pdfaProperty="http://www.aiim.org/pdfa/ns/property\hyxmp@hash"^^J%
2062 -----xmlns:pdfaType="http://www.aiim.org/pdfa/ns/type\hyxmp@hash"^^J%
2063 -----xmlns:pdfaField="http://www.aiim.org/pdfa/ns/field\hyxmp@hash">^^J%
2064   }%
```

Declare non-standard schemata.

```
2065 \hyxmp@check@iptc@data
2066 \hyxmp@check@prism@data
2067 \hyxmp@check@jav@data
2068 \hyxmp@declare@extensions
```

Insert all the metadata we know how to insert.

```
2069 \hyxmp@pdf@schema
2070 \hyxmp@xmpRights@schema
2071 \hyxmp@dc@schema
2072 \hyxmp@photoshop@schema
2073 \hyxmp@xmp@basic@schema
2074 \hyxmp@pdfa@id@schema
2075 \hyxmp@pdfua@id@schema
2076 \hyxmp@pdfx@id@schema
2077 \hyxmp@mm@schema
2078 \hyxmp@iptc@schema
2079 \hyxmp@prism@schema
2080 \hyxmp@jav@schema
2081 \hyxmp@xmptpg@schema
2082 \hyxmp@add@to+xml{%
2083 ____</rdf:Description>^^J%
2084 __</rdf:RDF>^^J%
2085 </x:xmpmeta>^^J%
2086 \hyxmp@padding
2087 <?xpacket end="w"?>^^J%
2088   }%
2089 }
```

3.7 Embedding the XMP packet

The PDF specification says that “a metadata stream may be attached to a document through the Metadata entry in the document catalogue” [4] so that’s what we do

here.

`\hyxmp@embed@packet` Determine which hyperref driver is in use and invoke the appropriate embedding
`\hyxmp@driver` function.

```
2090 \newcommand*{\hyxmp@embed@packet}{%
2091   \hyxmp@construct@packet
2092   \def\hyxmp@driver{hpdfTEX}%
2093   \ifx\hyxmp@driver\Hy@driver
2094     \hyxmp@embed@packet@pdfTEX
2095   \else
2096     \def\hyxmp@driver{hLUAteX}%
2097     \ifx\hyxmp@driver\Hy@driver
2098       \hyxmp@embed@packet@LUAteX
2099     \else
2100       \def\hyxmp@driver{hdvipdfm}%
2101       \ifx\hyxmp@driver\Hy@driver
2102         \hyxmp@embed@packet@dvipdfm
2103       \else
2104         \def\hyxmp@driver{hXeTeX}%
2105         \ifx\hyxmp@driver\Hy@driver
2106           \hyxmp@embed@packet@XeTeX
2107         \else
2108           \@ifundefined{pdfmark}{%
2109             \PackageWarningNoLine{hyperxmp}{%
2110               Unrecognized hyperref driver ‘\Hy@driver’.\MessageBreak
2111               \hyxmp@jobname.tex’s XMP metadata will *not* be\MessageBreak
2112               embedded in the resulting file}%
2113           }{%
2114             \hyxmp@embed@packet@pdfmark
2115           }%
2116         \fi
2117       \fi
2118     \fi
2119   \fi
2120 }
```

3.7.1 Embedding using pdf_{TEX}

Up to version 0.85, Lua_{TEX} supported the pdf_{TEX} primitives, and hyperref didn’t distinguish the two backends. However, from hyperxmp’s perspective there is one key difference: the effect of `\pdfcompresslevel` is local to a group in pdf_{TEX} but is global in Lua_{TEX}.

The PDF object representing the XMP packet is supposed to include an uncompressed stream so it can be read by non-PDF-aware tools. However, we don’t want to unnecessarily uncompress *every* PDF stream. The solution, provided by Hans Hagen on the `luatex` mailing list (thread: “[Leaving a single PDF object uncompressed](#)”, 6 JUL 2016), is to provide the `uncompressed` flag to `\pdfobj`. Our definition of `\hyxmp@embed@packet@pdfTEX` uses the `ifluatex` package to distinguish the pdf_{TEX} case from the pre-0.85 Lua_{TEX} case.

```
2121 \RequirePackage{ifluatex}
```

`\hyxmp@embed@packet@pdfTEX` Embed the XMP packet using pdf_{TEX} primitives, which are supported by both pdf_{TEX} and pre-0.85 Lua_{TEX}. The only difference is that in the former case we

locally specify `\pdfcompresslevel=0` to leave the PDF object uncompressed while in the latter case we pass the `uncompressed` flag to `\pdfobj` to achieve the same effect.

```

2122 \newcommand*{\hyxmp@embed@packet@pdftex}{%
2123   \bgroup
2124     \ifluatex
2125     \else
2126       \pdfcompresslevel=0
2127     \fi
2128     \immediate\pdfobj \ifluatex uncompressed\fi stream attr {%
2129       /Type /Metadata
2130       /Subtype /XML
2131     }\hyxmp@xml}%
2132   \pdfcatalog {/Metadata \the\pdflastobj\space 0 R}%
2133 \egroup
2134 }

```

3.7.2 Embedding using LuaTeX 0.85+

`\hyxmp@embed@packet@luatex` Embed the XMP packet using LuaTeX 0.85+ primitives.

```

2135 \newcommand*{\hyxmp@embed@packet@luatex}{%
2136   \immediate\pdfextension obj uncompressed stream attr {%
2137     /Type /Metadata
2138     /Subtype /XML
2139   }\hyxmp@xml}%
2140   \pdfextension catalog {/Metadata \the\numexpr\pdffeedback lastobj\relax\space 0 R}%
2141 }

```

3.7.3 Embedding using any pdfmark-based backend

`\hyxmp@embed@packet@pdfmark` Embed the XMP packet using hyperref's `\pdfmark` command. I believe `\pdfmark` is used by the `dvipdf`, `dvipdfone`, `dvips`, `dviwindo`, `nativepdf`, `pdfmark`, `ps2pdf`, `textures`, and `vtexpdfmark` options to `hyperref`, but I've tested only a few of those.

```

2142 \newcommand*{\hyxmp@embed@packet@pdfmark}{%
2143   \pdfmark{%
2144     pdfmark=/NamespacePush
2145   }%
2146   \pdfmark{%
2147     pdfmark=/OBJ,
2148     Raw={/_objdef \string{hyxmp@Metadata\string} /type /stream}%
2149   }%
2150   \pdfmark{%
2151     pdfmark=/PUT,
2152     Raw={\string{hyxmp@Metadata\string}
2153       2 dict begin
2154         /Type /Metadata def
2155         /Subtype /XML def
2156         currentdict
2157       end
2158     }%
2159   }%
2160   \pdfmark{%
2161     pdfmark=/PUT,

```

```

2162   Raw={\string{hyxmp@Metadata\string} (\hyxmp@xml)}%
2163 }%
2164 \pdfmark{%
2165   pdfmark=/Metadata,
2166   Raw={\string{Catalog\string} \string{hyxmp@Metadata\string}}%
2167 }%
2168 \pdfmark{%
2169   pdfmark=/NamespacePop
2170 }%
2171 }

```

3.7.4 Embedding using dvipdfm

`\hyxmp@embed@packet@dvipdfm` Embed the XMP packet using dvipdfm-specific `\special` commands. Note that dvipdfm rather irritatingly requires us to count the number of characters in the `\hyxmp@xml` stream ourselves.

```

2172 \newcommand*{\hyxmp@embed@packet@dvipdfm}{%
2173   \hyxmp@string@len{\hyxmp@xml}%
2174   \special{pdf: object @hyxmp@Metadata
2175     <<
2176       /Type /Metadata
2177       /Subtype /XML
2178       /Length \the\@hyxmp@count
2179     >>
2180     stream^^J\hyxmp@xml endstream%
2181   }%
2182   \special{pdf: docview
2183     <<
2184       /Metadata @hyxmp@Metadata
2185     >>
2186   }%
2187 }

```

`\hyxmp@string@len` Set `\@hyxmp@count` to the number of characters in a given string (`#1`). The approach is first to tally the number of space characters then to tally the number of non-space characters. While this is rather sloppy I haven't found a better way to achieve the same effect, especially given that all of the characters in `#1` have already been assigned their category codes.

```

2188 \newcommand*{\hyxmp@string@len}[1]{%
2189   \@hyxmp@count=0
2190   \expandafter\hyxmp@count@spaces#1 {} %
2191   \expandafter\hyxmp@count@non@spaces#1{}%
2192 }

```

`\hyxmp@count@spaces` Count the number of spaces in a given string. We rely on the built-in pattern matching of T_EX's `\def` primitive to pry one word at a time off the head of the input string.

```

2193 \def\hyxmp@count@spaces#1 {%
2194   \def\hyxmp@one@token{#1}%
2195   \ifx\hyxmp@one@token\@empty
2196     \advance\@hyxmp@count by -1
2197   \else
2198     \advance\@hyxmp@count by 1

```

```

2199   \expandafter\hyxmp@count@spaces
2200   \fi
2201 }

```

`\hyxmp@count@non@spaces` Count the number of non-spaces in a given string. Ideally, we'd count both spaces and non-spaces but \TeX won't bind `#1` to a space character (category code 10). Hence, in each iteration, `#1` is bound to the next non-space character only.

```

2202 \newcommand*\hyxmp@count@non@spaces}[1]{%
2203   \def\hyxmp@one@token{#1}%
2204   \ifx\hyxmp@one@token\@empty
2205   \else
2206     \advance\hyxmp@count by 1
2207     \expandafter\hyxmp@count@non@spaces
2208   \fi
2209 }

```

3.7.5 Embedding using $X_{\text{q}}\TeX$

`\hyxmp@embed@packet@xetex` Embed the XMP packet using `xdvipdfmx`-specific `\special` commands. I don't know how to tell `xdvipdfmx` always to leave the Metadata stream uncompressed, so the XMP metadata is likely to be missed by non-PDF-aware XMP viewers.

```

2210 \newcommand*\hyxmp@embed@packet@xetex}{%
2211   \special{pdf:stream @hyxmp@Metadata (\hyxmp+xml)
2212     <<
2213       /Type /Metadata
2214       /Subtype /XML
2215     >>
2216   }%
2217   \special{pdf:put @catalog
2218     <<
2219       /Metadata @hyxmp@Metadata
2220     >>
2221   }%
2222 }

```

3.8 Final clean-up

As explained in Section 3.1, all invocations of `\AtEndPreamble` have been stored in `\hyxmp@aep@toks` rather than executed. Now that `hyperxmp` has been initialized completely, it is finally safe to execute the accumulated `\AtEndPreamble` stanzas.

```
2223 \the\hyxmp@aep@toks
```

Having saved the category code of “ ” at the start of the package code (Section 3.1), we now restore that character's original category code.

```
2224 \catcode'\="=\hyxmp@dq@code
```

4 Help Wanted

Comma handling Ideally, `\xmpquote` should automatically replace all commas with `\xmpcomma`. Unfortunately, my \TeX skills are insufficient to pull that off. If you know a way to make `\xmpquote{Hello, world}` work with both Unicode and

non-Unicode encodings and with all T_EX engines (pdfT_EX, LuaT_EX, X_YT_EX, etc.), please send me a code patch.

A Sample XMP Packet

The following is an example of a complete XMP packet as may be produced by hyperxmp. This packet corresponds to the metadata included in the sample L^AT_EX document presented on pages 9–11. For clarity, metadata values, either specified explicitly by the document or introduced automatically by hyperxmp, are colored blue.

```
<?xpacket begin="\357\273\277" id="W5M0MpCehiHzreSzNTczkc9d"?>
<x:xmpmeta xmlns:x="adobe:ns:meta/">
  <rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
    <rdf:Description rdf:about=""
      xmlns:pdf="http://ns.adobe.com/pdf/1.3/"
      xmlns:xmpRights="http://ns.adobe.com/xap/1.0/rights/"
      xmlns:dc="http://purl.org/dc/elements/1.1/"
      xmlns:photoshop="http://ns.adobe.com/photoshop/1.0/"
      xmlns:xmp="http://ns.adobe.com/xap/1.0/"
      xmlns:xmpMM="http://ns.adobe.com/xap/1.0/mm/"
      xmlns:stEvt="http://ns.adobe.com/xap/1.0/sType/ResourceEvent#"
      xmlns:pdfaid="http://www.aiim.org/pdfa/ns/id/"
      xmlns:pdfuaid="http://www.aiim.org/pdfua/ns/id/"
      xmlns:pdfx="http://ns.adobe.com/pdfx/1.3/"
      xmlns:prism="http://prismstandard.org/namespaces/basic/3.0/"
      xmlns:jav="http://www.niso.org/schemas/jav/1.0/"
      xmlns:xmpTPg="http://ns.adobe.com/xap/1.0/t/pg/"
      xmlns:stFnt="http://ns.adobe.com/xap/1.0/sType/Font#"
      xmlns:Iptc4xmpCore="http://iptc.org/std/Iptc4xmpCore/1.0/xmlns/"
      xmlns:pdfaExtension="http://www.aiim.org/pdfa/ns/extension/"
      xmlns:pdfaSchema="http://www.aiim.org/pdfa/ns/schema#"
      xmlns:pdfaProperty="http://www.aiim.org/pdfa/ns/property#"
      xmlns:pdfaType="http://www.aiim.org/pdfa/ns/type#"
      xmlns:pdfaField="http://www.aiim.org/pdfa/ns/field#">
    <pdfaExtension:schemas>
      <rdf:Bag>
        :
        [over 200 lines of boilerplate definitions not shown]
        :
      </rdf:Bag>
    </pdfaExtension:schemas>
    <pdf:Keywords>
      energy quanta, Hertz effect, quantum physics
    </pdf:Keywords>
    <pdf:Producer>
      LuaHBTeX, Version 1.12.0 (TeX Live 2020)
    </pdf:Producer>
    <pdf:PDFVersion>1.5</pdf:PDFVersion>
    <xmpRights:Marked>True</xmpRights:Marked>
```

```

<xmpRights:WebStatement>
  http://creativecommons.org/licenses/by-nc-nd/3.0/
</xmpRights:WebStatement>
<dc:format>application/pdf</dc:format>
<dc:title>
  <rdf:Alt>
    <rdf:li xml:lang="x-default">
      On a heuristic viewpoint concerning the production
      and transformation of light
    </rdf:li>
    <rdf:li xml:lang="en">
      On a heuristic viewpoint concerning the production
      and transformation of light
    </rdf:li>
    <rdf:li xml:lang="de">
      Über einen die Erzeugung und Verwandlung des Lichtes
      betreffenden heuristischen Gesichtspunkt
    </rdf:li>
  </rdf:Alt>
</dc:title>
<dc:description>
  <rdf:Alt>
    <rdf:li xml:lang="en">photoelectric effect</rdf:li>
  </rdf:Alt>
</dc:description>
<dc:rights>
  <rdf:Alt>
    <rdf:li xml:lang="en">Copyright (C) 1905, Albert Einstein</rdf:li>
  </rdf:Alt>
</dc:rights>
<dc:publisher>
  <rdf:Bag>
    <rdf:li>Wiley-VCH</rdf:li>
  </rdf:Bag>
</dc:publisher>
<dc:creator>
  <rdf:Seq>
    <rdf:li>Albert Einstein</rdf:li>
  </rdf:Seq>
</dc:creator>
<dc:subject>
  <rdf:Bag>
    <rdf:li>energy quanta</rdf:li>
    <rdf:li>Hertz effect</rdf:li>
    <rdf:li>quantum physics</rdf:li>
  </rdf:Bag>
</dc:subject>
<dc:date>
  <rdf:Seq>
    <rdf:li>1905-03-17</rdf:li>
  </rdf:Seq>
</dc:date>
<dc:language>
  <rdf:Bag>

```



```

    <rdf:li>en</rdf:li>
  </rdf:Bag>
</dc:language>
<dc:type>
  <rdf:Bag>
    <rdf:li>Text</rdf:li>
  </rdf:Bag>
</dc:type>
<dc:source>einstein.tex</dc:source>
<dc:identifier>info:lccn/50013519</dc:identifier>
<photoshop:AuthorsPosition>
  Technical Assistant, Level III
</photoshop:AuthorsPosition>
<photoshop:CaptionWriter>Scott Pakin</photoshop:CaptionWriter>
<xmp:CreateDate>2020-07-25T21:37:02-06:00</xmp:CreateDate>
<xmp:ModifyDate>2020-07-25T21:37:02-06:00</xmp:ModifyDate>
<xmp:MetadataDate>2020-07-25T21:37:02-06:00</xmp:MetadataDate>
<xmp:CreatorTool>LaTeX with hyperref package</xmp:CreatorTool>
<xmpMM:DocumentID>
  uuid:6d1ac9ec-4ff2-515a-954b-648eeb4853b0
</xmpMM:DocumentID>
<xmpMM:InstanceID>
  uuid:3e4c4182-b182-46c9-995f-754c41d13390
</xmpMM:InstanceID>
<xmpMM:VersionID>2.998e8</xmpMM:VersionID>
<xmpMM:RenditionClass>default</xmpMM:RenditionClass>
<Iptc4xmpCore:CreatorContactInfo rdf:parseType="Resource">
  <Iptc4xmpCore:CiAdrExtadr>Kramgasse 49</Iptc4xmpCore:CiAdrExtadr>
  <Iptc4xmpCore:CiAdrCity>Bern</Iptc4xmpCore:CiAdrCity>
  <Iptc4xmpCore:CiAdrPcode>3011</Iptc4xmpCore:CiAdrPcode>
  <Iptc4xmpCore:CiAdrCtry>Switzerland</Iptc4xmpCore:CiAdrCtry>
  <Iptc4xmpCore:CiTelWork>031 312 00 91</Iptc4xmpCore:CiTelWork>
  <Iptc4xmpCore:CiEmailWork>aeinstein@ipi.ch</Iptc4xmpCore:CiEmailWork>
  <Iptc4xmpCore:CiUrlWork>
    http://einstein.biz/,
    https://www.facebook.com/AlbertEinstein
  </Iptc4xmpCore:CiUrlWork>
</Iptc4xmpCore:CreatorContactInfo>
<prism:complianceProfile>three</prism:complianceProfile>
<prism:subtitle xml:lang="en-US">
  Putting that bum Maxwell in his place
</prism:subtitle>
<prism:publicationName xml:lang="de">
  Annalen der Physik
</prism:publicationName>
<prism:aggregationType>journal</prism:aggregationType>
<prism:volume>322</prism:volume>
<prism:number>6</prism:number>
<prism:pageRange>132-148</prism:pageRange>
<prism:issn>0003-3804</prism:issn>
<prism:eIssn>1521-3889</prism:eIssn>
<prism:doi>10.1002/andp.19053220607</prism:doi>
<prism:url>
  http://www.physik.uni-augsburg.de/annalen/history/einstein-papers/190517132-148.pdf

```

```

</prism:url>
<prism:byteCount>41197</prism:byteCount>
<prism:pageCount>1</prism:pageCount>
<jav:journal_article_version>VoR</jav:journal_article_version>
<xmpTPg:Fonts>
  <rdf:Bag>
    <rdf:li rdf:parseType="Resource">
      <stFnt:fontFace>LMRoman10-Regular</stFnt:fontFace>
      <stFnt:fontFamily>LM Roman 10</stFnt:fontFamily>
      <stFnt:fontName>LMRoman10-Regular</stFnt:fontName>
      <stFnt:versionString>
        2.004;PS 2.004;hotconv 1.0.49;makeotf.lib2.0.14853
      </stFnt:versionString>
      <stFnt:fontFileName>lmroman10-regular.otf</stFnt:fontFileName>
      <stFnt:fontType>opentype</stFnt:fontType>
    </rdf:li>
    <rdf:li rdf:parseType="Resource">
      <stFnt:fontFace>LMRoman17-Regular</stFnt:fontFace>
      <stFnt:fontFamily>LM Roman 17</stFnt:fontFamily>
      <stFnt:fontName>LMRoman17-Regular</stFnt:fontName>
      <stFnt:versionString>
        2.004;PS 2.004;hotconv 1.0.49;makeotf.lib2.0.14853
      </stFnt:versionString>
      <stFnt:fontFileName>lmroman17-regular.otf</stFnt:fontFileName>
      <stFnt:fontType>opentype</stFnt:fontType>
    </rdf:li>
    <rdf:li rdf:parseType="Resource">
      <stFnt:fontFace>LMRoman12-Regular</stFnt:fontFace>
      <stFnt:fontFamily>LM Roman 12</stFnt:fontFamily>
      <stFnt:fontName>LMRoman12-Regular</stFnt:fontName>
      <stFnt:versionString>
        2.004;PS 2.004;hotconv 1.0.49;makeotf.lib2.0.14853
      </stFnt:versionString>
      <stFnt:fontFileName>lmroman12-regular.otf</stFnt:fontFileName>
      <stFnt:fontType>opentype</stFnt:fontType>
    </rdf:li>
    <rdf:li rdf:parseType="Resource">
      <stFnt:fontName>cmr12</stFnt:fontName>
    </rdf:li>
    <rdf:li rdf:parseType="Resource">
      <stFnt:fontName>cmr8</stFnt:fontName>
    </rdf:li>
    <rdf:li rdf:parseType="Resource">
      <stFnt:fontName>cmr6</stFnt:fontName>
    </rdf:li>
    <rdf:li rdf:parseType="Resource">
      <stFnt:fontName>cmmi12</stFnt:fontName>
    </rdf:li>
    <rdf:li rdf:parseType="Resource">
      <stFnt:fontName>cmmi8</stFnt:fontName>
    </rdf:li>
    <rdf:li rdf:parseType="Resource">
      <stFnt:fontName>cmmi6</stFnt:fontName>
    </rdf:li>
  </rdf:Bag>

```

```

<rdf:li rdf:parseType="Resource">
  <stFnt:fontName>cmsy10</stFnt:fontName>
</rdf:li>
<rdf:li rdf:parseType="Resource">
  <stFnt:fontName>cmsy8</stFnt:fontName>
</rdf:li>
<rdf:li rdf:parseType="Resource">
  <stFnt:fontName>cmsy6</stFnt:fontName>
</rdf:li>
<rdf:li rdf:parseType="Resource">
  <stFnt:fontName>cmex10</stFnt:fontName>
</rdf:li>
</rdf:Bag>
</xmpTPg:Fonts>
<xmpTPg:NPages>1</xmpTPg:NPages>
</rdf:Description>
</rdf:RDF>
</x:xmpmeta>
<?xpacket end="w"?>

```

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Change History

v1.0		Daniel Schömer for the bug report	81
General: Initial version	1		
v1.1		v1.2	
\hyxmp@construct@packet:		General: Added support for the X _Y TEX backend (xdvipdfmx)	1
Explicitly set the category codes of characters $\langle EF \rangle$, $\langle BB \rangle$, and $\langle BF \rangle$ to “letter”. Thanks to		Added support for the Photoshop schema	1

Made the package compatible with <code>ngerman</code> . Thanks to Tobias Mueller for the bug report.	18	<code>\hyxmp@crap@test</code> : Added by Heiko Oberdiek	52
v1.3		<code>\hyxmp@dc@schema</code> : Added support for <code>dc:language</code> and <code>dc:source</code>	65
General: Introduced the <code>pdfmetalang</code> package option, which enables an author to specify the language in which he wrote the document's metadata	33	<code>\hyxmp@is@unicode</code> : Added by Heiko Oberdiek	50
v1.4		<code>\hyxmp@list@to+xml</code> : Modified by Heiko Oberdiek to use the new Unicode-processing macros	64
<code>\hyxmp@mm@schema</code> : Renamed the <code>xapMM</code> namespace prefix to <code>xmpMM</code>	67	<code>\hyxmp@photoshop@schema</code> : Simplified using <code>\hyxmp@add@simple</code>	68
<code>\hyxmp@rdf@dc</code> : Included metadata in the x-default language regardless of the specified metadata language	62	<code>\hyxmp@ProcessKeyvalOptions</code> : Added this macro	29
<code>\hyxmp@xmpRights@schema</code> : Renamed the <code>xapRights</code> namespace prefix to <code>xmpRights</code>	66	<code>\hyxmp@skiptorelax</code> : Added by Heiko Oberdiek	53
v1.5		<code>\hyxmp@skipzeros</code> : Added by Heiko Oberdiek	51
General: Made the XMP inclusion more robust. Thanks to Heiko Oberdiek for the bug report and suggested modifications.	18	<code>\hyxmp@SpaceOther</code> : Added by Heiko Oberdiek	52
v2.0		<code>\hyxmp@toxml</code> : Added by Heiko Oberdiek	50
General: Added support for the XMP Basic schema and miscellaneous other bits of metadata	1	Escaped parentheses written with <code>pdfmarks</code> to prevent <code>dvips</code> from line-wrapping the XMP packet	51
Heiko Oberdiek's major rewrite of the code to better support native-Unicode <code>TeX</code> implementations (<code>X_qTeX</code> and <code>LuaTeX</code>)	1	<code>\hyxmp@toxml@unicodetex</code> : Added by Heiko Oberdiek	51
New <code>\AtBeginDocument</code> code from Heiko Oberdiek to properly encode <code>\@pdfmetalang</code>	33	<code>\hyxmp@xetex@crap</code> : Added by Heiko Oberdiek	52
<code>\hyxmp@add@simple</code> : Added this macro	54	<code>\hyxmp@xmlify</code> : Completely rewritten by Heiko Oberdiek to better support Unicode-enabled <code>TeX</code> programs	49
<code>\hyxmp@add@to+xml</code> : Updated also to replace commas	59	<code>\hyxmp@xmp@basic@schema</code> : Added this macro	67
<code>\hyxmp@bom</code> : Added by Heiko Oberdiek	81	<code>\hyxmp@xmpRights@schema</code> : Modified to include <code>xmpRights:Marked</code> only when <code>pdfcopyright</code> is specified and <code>xmpRights:WebStatement</code> only when <code>pdflicenseurl</code> is specified	66
<code>\hyxmp@comma</code> : Added this macro	42	<code>\hyxmp@zero</code> : Added by Heiko Oberdiek	53
<code>\hyxmp@construct@packet</code> : Modified by Heiko Oberdiek to use an appropriate BOM representation via <code>\hyxmp@bom</code>	81	<code>\ifhyxmp@unicodetex</code> : Added by Heiko Oberdiek	48
<code>\hyxmp@crap@convert</code> : Added by Heiko Oberdiek	53	<code>\ProcessKeyvalOptions</code> : Added this macro	29
		<code>\xmpcomma</code> : Added this macro	42
		<code>\xmpquote</code> : Added this macro	42
		<code>\XMPTruncateList</code> : Added this macro	42
		v2.1	
		General: Enabled <code>hyperxmp</code> and	

hyperref to be loaded in either order. This addresses a bug report by Yury Donskoy	27	conform to the latest XMP specifications, a detail identified by Florian Breitwieser	65
<code>\hypersetup</code> : Added this macro	29	<code>\hyxmp@parse@time</code> : Added this macro	44
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<code>\hyxmp@iptc@extensions</code> : Added this macro to support PDF/A generation	77	<code>\hyxmp@pdfa@id@schema</code> : Added this macro	68
<code>\hyxmp@iptc@schema</code> : Added this macro	70	<code>\hyxmp@today@xmp</code> : Modified the code to parse the time and timezone from <code>\pdfcreationdate</code> , as proposed by Florian Breitwieser	47
<code>\hyxmp@list@to@lines</code> : Added this macro	69	<code>\hyxmp@today@xmp@define</code> : Added this macro	46
<code>\xmpcomma</code> : Changed the default from <code>\relax</code> to an ordinary comma	42	<code>\hyxmp@xmp@to@pdf@date</code> : Added this macro	44
<code>\xmplinesep</code> : Added this macro	69	<code>\xmptilde</code> : Added this macro	42
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