The Class `hpitr` for Writing Technical Reports at the Hasso Plattner Institute

Tobias Pape

Hasso Plattner Institute
tobias.pape@hpi.uni-potsdam.de

This constitutes the class to create technical reports at the Hasso Plattner Institute, Potsdam in conjunction with the Universitätsverlag Potsdam. To maintain a unified appearance, this class provides macrotypographic (like paper size and general layout) and microtypographic (like fonts and their adjustment) settings.

This manual gives a concise usage guide for the `hpitr` class, used to prepare technical reports at the Hasso Plattner Institute, Potsdam in conjunction with the Universitätsverlag Potsdam. We describe newly introduced commands and environments and document deviations from what may seem typical, like non-standard paper size.

This is file version v1.7 of file `hpitr.ltx`.

Contents

1 Introduction

All technical reports the Hasso-Plattner-Institut for Digital Engineering (HPI) issues should have a uniform appearance. The LATEX class `hpitr` exists for this very purpose. Its aim is to ease the work with and on technical reports of the HPI and ensure their uniformity.

This manual illustrates the means this LATEX class provides and explains the necessary constraints.

1.1 A note on LATEX elements

```
c \command
e environment
o option
v option=value
```

To easily find documentation to specific LATEX elements this class provides, that location is highlighted by a box like above. Every LATEX element is prefixed by its type: command sequences *c*, environments *e*, class options *o*, and values to class option keys *v*. This should help navigating in the manual.

1.2 An Example

As jump-start, a very minimal but complete `hpitr` technical report follows:

```
\documentclass[english,trtype=singlereport]{hpitr}
\usepackage[backend=biber]{biblatex}
\addbibresource{references.bib}

\begin{document}
\title{The importance of why and how to do work}
\subtitle{An imaginary paper}
\author{Anna Author\and Bert Betatester}
\keywords{paper, showcase, lorem ipsum}
\maketitle

\begin{abstract}
  This "paper"…
\end{abstract}
\chapter{Introduction}
In computer science~\cite{myref}...
\chapter{...}
...
```

```
\printbibliography
\end{document}
```

This example sets a `hpitr` report that

- is an original report (`trtype=singlereport`),

- uses Biblatex with biber,

- and gives all meta-information for title, author, and keywords.

The typical selection of the input encoding (`\usepackage[...]{inputenc}`) is not present in this example on purpose. All files of `hpitr` reports are to be written using UTF-8 encoding. The class file takes care to select the right input encoding.

> All files of a `hpitr` report must be UTF-8 encoded.

1.3 Running LaTeX

`hpitr` reports are handed to the publisher *Universitätsverlag Potsdam* as PDF files. The `hpitr` class support the three major TeX engines that directly produce PDF files:

- pdfTeX (executable `pdflatex`),

- LuaTeX (executable `lualatex`), and

- XeTeX (executable `xelatex`).

For best results, and for best Unicode and UTF-8 support, the LuaTeXengine is recommended. For the same reason, it is recommended to use Biblatex with the biber engine instead of plain BibTeX.

A typical LaTeX run for a `hpitr` report should look like this:

```
lualatex report
biber report
lualatex report
lualatex report
```

This should build the PDF file with all bibliographic information.

2 Report Structure

2.1 Types of Reports

> *o* `trtype=`⟨*type*⟩

This class support the types of technical reports that are common at the HPI. In essence, there are three variants.

> *v* `trtype=singlearticle`
> *v* `trtype=article`
> *o* `singlearticle`

Article-like reports   Reports that are basically similar to conference or journal articles or extend such articles have an *article-like* character. Their top-level sectioning element is the *sections*.

```
v trtype=singlereport
v trtype=report
o single
o singlereport
```

Original reports   Reports that are like monographs (such as theses) or inherently independent reports are report in the strict sense.[1] Their top-level sectioning element is the *chapter*.

This is the default type if none is given explicitly.

```
v trtype=collection
o collection
v trtype=proceedings
o proceedings
```

Collection-like reports   Reports comprising several individual contributions are *collection-like*. This may include conference proceedings, seminar compilations, or special issues, among others. Their top-level sectioning element is the *chapter*. Some commands to manage such collections are provided for convenience.

Note that proceeding use a different formatting for the individual contributions. They start with their own title, author information, and abstract, while in normal collections, this information is absent. In normal collections, all sections are numbered by chapter.

```
v trtype=inproceedings
o inproceedings
```

Contributions   The `hpitr` class supports an additional report type, *inproceedings* that is not intended to be published as is. Rather, this type can be used to produce a PDF version of an individual contribution to a proceedings-like report for further processing.

---

[1]Not implying that the other types are inadequate as technical reports, to the contrary!

2.2 Report Information and Metadata

```
c \title
c \subtitle
c \author
c \keywords
c \maketitle
e abstract
```

A set of specific information and metadata has to be provided for all reports. This comprises

- the title in English and German,

- all authors' names,

- keywords in English and German, and

- abstracts in English and German

which have to be provided *in addition* to the PDF file.

All but the abstracts have to be also present in the PDF metadata. The `hpitr` class takes care of that as long as the common LATEX commands are used, i.e.

`\title{`⟨*work title*⟩`}`

`\subtitle{`⟨*optional subtitle*⟩`}`

`\author{`⟨*list of authors separated by* `\and`⟩`}`

`\keywords{`⟨*list of comma separated keywords*⟩`}`, and `\maketitle` is used to make them persistent.

Note that `\maketitle`, contrary to normal practice, does *not* create a title page nor will it create a noticeable title on the first page. This is intentional, as the *actual* title page for `hpitr` reports is provided by the publisher.

However, the abstract, given in the `abstract` environment, is printed. It is typically the first page for article-like and original reports. Collection-like reports do not have an abstract but should rather have a dedicated preface or foreword.

```
c \principalInvestigator
c \event
c \affiliation
c \email
c \institute
c \group
c \organization
```

Contributions in collection-like reports are treated specially.

```
c \part
c \chapter
c \section
c \subsection
c \subsubsection
c \paragraph
c \minisec
```

2.3 Structuring Elements

The typical LaTeX commands to structure documents are available to `hpitr` reports with only few restrictions.

The command `\chapter` is only available to original reports and colloection-like reports. All kind of reports can use the commands `\section` to `\subsubsection` to structure documents, they created numbered sections. All of these commands exists in starred variants (e.g. `\section*`) to create un-numbered structure elements.

The command `\paragraph` will always create an unnumbered structure element. The body text continues right after its title with no line in between. Ad-hoc sections can be created with the `\minisec` command, it will always create an unnumbered section.

The `\part` command should be used only sparingly, in rather long documents. Longer original or proceedings-like reports may justify the use of parts.

`\subparagraph` should not be used.

Proceedings-like Reports

In proceedings-like reports, chapters should only be used outside the individual contributions as each contribution acts like an article-like report. Hence *within* individual contributions, only sections and possibly paragraphs should be used. Appendix and bibliography act like sections and do not appear on a page of their own. Chapter should be used for general document parts such as a preface or foreword, closing remarks, or a general introduction.

```
c \tableofcontents
c \listoffigures
c \listoftables
c \listoflistings ...
```

The Table of Contents

Reports should contain a table of contents (`\tableofcontents`) if they are not article-like. If present, it should be placed *after* the abstract, foreword, or preface. Hence, those do not show up in the table of contents.

The table of contents may be followed by the list of figures (`\listoffigures`) or tables (`\listoftables`) present in the document. Some packages provide individual lists that may also be used here, e.g. the `listings` package provides a `\listoflistings`. All those lists should *not* be listed in the table of contents.

Individual contributions of proceedings-like reports should not have a table of contents on their own.

```
o intoc=⟨element⟩
v intoc=title
v intoc=notitle
v intoc=author
v intoc=noauthor
v intoc=affiliation
v intoc=noaffiliation
v intoc=principalInvestigator
v intoc=noprincipalInvestigator
v intoc=event
v intoc=noevent
v intoc=all
```

Elements in the Table of Contents for Collection-like Reports
Collection-like reports may come in several falvors that all require a slightly different formatting for the table of contents. Plain collections typically just require the chapter titles of each contribution, while proceedings might want to spell out titles or author names, *&c.*

The option `intoc` provides a way to customize the appearance of the table of contents. It may be given multiple times to control for each element of a contirbution whether it should appear in the table of contents. These include all metadata elements in subsection 2.2.

Per default, `title` and `author` are enabled, the rest is disabled. Enabling `all` would look like this:
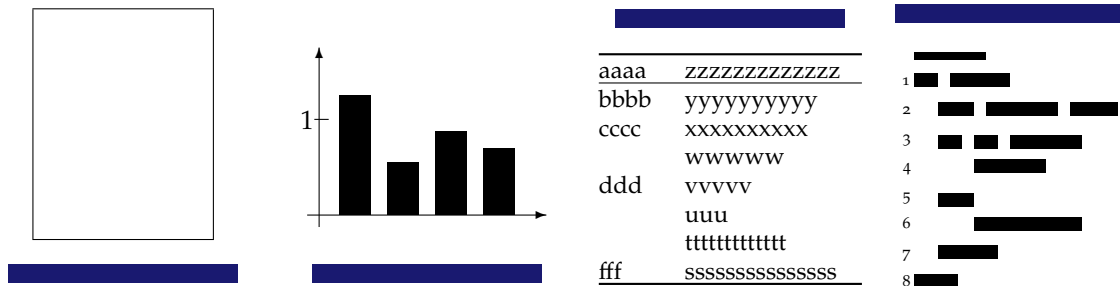
Contents

3 Layout

The technical reports of the HPI are published both in printed form and online. To retain a uniform appearance across those media *and* across all supported report types, all report have to adhere to the same layout.

3.1 Page and type area

- All text is set in a single column.

- The paper size is $210\,\text{mm} \times 297\,\text{mm}$ (ISO 216 A4 *aka* DIN A4); the aspect ratio is $\sqrt{2}$.

- There should be typically not more than 85 characters per line.

- The type area aspect ratio is ϕ, the *golden ratio*.

- The margins fulfill the following equations:

$$top < left \leq right < bottom \text{ and } top : bottom = 1 : 2$$

Figure 1: Recommended positions for float captions.

To ensure this layout, the class chooses (approximately) the side margins as 99 pt or 81/4 pc, the top margin 66 pt or 51/2 pc, and the bottom margin as 135 pt or 111/4 pc[2].

Page numbers are set centered on the page foot.

> The page dimensions, margins, and type area must not be changed.

3.2 Titles, Document Parts, and Page Numbering

As pointed our earlier, there is no actual title for `hpitr` reports, it is provided by the publisher. Hence, the page number for the first page is actually 5.

The page numbering defaults to arabic numbers.

```
c \frontmatter
c \mainmatter
c \backmatter
```

Only in collection-like reports, a distinction between frontmatter, mainmatter, and backmatter is possible. The page numbering should be roman lowercase in the frontmatter and arabic in the main and backmatter. The first page number of the frontmatter should be "v".

3.3 Floats

All non-text content that warrants its own space and is referenced in the document is treated as floating content. This includes figures, tables, and listings to name a few.

Floats may be placed at the point it is given in the source, but may be moved by LATEX to the bottom or the top of a page, or to a page of its own. This moving around is intentional.

---

[2]about 34.9 mm, 23.3 mm, and 47.6 mm, respectively

Note: Floats that rely on being placed *exactly* at the point inserted aren't floats proper and also should not need a caption.[3].

Every float should have a caption, that is placed at the top or the bottom of a float. Figures—typically graphics, graphs, or charts—are treated as a whole or read from the bottom left. Their captions therefore are placed *below* the float. Tables, code listings, algorithm, and similar are read from top to bottom and might span several pages. Hence, their captions are placed *above* the float (see Figure 1).

Floats are named by their type numbered within a chapter (original or collection-like reports) or with a section (article-like reports or contributions to a proceedings-like report).

4 Microtypography

For a consistent appearance, font choice and spacing has to stay stable. The `hpitr` class therefore selects the following fonts, space amounts, and dimensions.

4.1 Fonts

The body font family for `hpitr` reports is the

TeX Gyre Pagella

family from the GUST e-foundry[4], a digitization of "Palatino" by Hermann Zapf. It is set at 12 pt with a line spread of 15.12 pt. For typesetting source-code–like material, the mono-spaced

`Source Code Pro`

family by Adobe can be used. It is automatically scaled to match the body font. In the same way the sans serif

Source Sans Pro

family by Adobe can be used for special emphasis.

Generally, when emphasis is necessary, it is recommended to use *italic* or *small caps* shapes, and only sparingly resort to a bold font or a sans serif font, for that matter.

4.2 Spacing

All spacing is typically handled by the `hpitr` class. For reference, these are the spacings chosen:

- Paragraphs are set without vertical space but indented by one *em*, i.e. 12 pt. The first paragraph of a chapter or section is not indented.

---

[3]For that reason, the H specifier of the `float` package is not available
[4]http://www.gust.org.pl/projects/e-foundry

- The space before a chapter heading is three empty lines, the space after it, two empty lines.

- The space before a section heading is two empty lines, the space after it, one empty line.

- The space before and after a sub-section heading is one empty line.

- The space before a sub-sub-section heading is one empty line, no vertical space follows.

- The space before a paragraph heading is one empty line, no vertical or horizontal spaces follow.

- Floats are separated from the body text by two empty lines above and below the float.

- Floats are separated from another by one empty line.

4.3 Float captions

Captions of floats should be preceded by the un-abbreviated float type, e. g. Figure or Table, the float number and a colon, all in bold font. The caption that follows should be in normal font.

If the caption is only one line, it should be centered, if it spans multiple lines, it should be set flush left and all but the first line should be indented by one *em*, i. e. 12 pt.

Additional considerations

```
c \hairspace
c \eg  ,c \Eg
c \ie  ,c \Ie
c \zB  ,c \ZB
c \dh  ,c \Dh
o egiecomma
```

Note that in abbreviations with periods in either English or German, a *hairspace* or *half* space follow the period. Thus, the following should be avoided:

z.B. e. g. i. e.

but rather be

z.B. e.g. i.e.

For convenience, commands for i.e., e.g., d.h., and z.B. are provided in initial uppercase and lowercase form (\ie, \Ie, \eg, \Eg, *&c.*). The command \hairspace can be used to construct similar commands.

Considering i.e. and e.g., practice differs in regard to whether they should be followed by a comma. The option `egiecomma=true` can be used to automatically add a comma to their commands.

The command `\sloppy` is overused and should be refrained from. Rather, enclose a problematic paragraph by a `sloppypar` environment.

> The `\sloppy` command should not be used

5 Cross-References

The `hpitr` class supports a certain style of inter- and intra-document references.

> *c* `\autoref`

5.1 Intra-document References

To ease references in-between parts of a document, the `\autoref` command can be used, which produces the following reference texts:

5.1.1 Reports with chapters

For reports with chapters (but *not* for proceedings-like reports), the following reference schema is produced:

- For chapters: "chapter n"

- For section: "section $n.m$" where n is the number of the chapter

- For sub-section: "section $n.m.k$" where m is the number of the section and n is the number of the chapter. The word subsection is not used.

- For sub-sub-section: "section $n.m.k.l$" where k is the number of the subsection, m is the number of the section, and n is the number of the chapter. The word subsubsection is not used.

- For paragraphs: references to paragraphs should be avoided.

5.1.2 Reports without chapters

For reports without chapters and contributions to proceedings-like reports, the following reference schema is produced:

- For section: "section n"

- For sub-section: "section $n.m$" where n is the number of the section. The word subsection is not used.

- For sub-sub-section: "section $n.m.k$" where m is the number of the subsection and n is the number of the section.

- For paragraphs: references to paragraphs should be avoided.

If possible, the contributions of a proceedings-like report should not inter-reference each other.

The \autoref command can also be used to reference to floats.

5.2 Bibliographic References

```
c \cite
```

For citations and bibliographies, a *numeric* citation style is used. The numbers derive from the *alphabetic* sorting of the list of bibliographic entries at the end of the report (or the end of the individual contributions in collection works, if applicable). Given names are abbreviated.

[1] I. Nassi and B. Shneiderman. Flowchart techniques for structured programming. *SIG-PLAN Not.*, 8(8):12–26, 1973.

This corresponds to the *plain* BibTEXstyle, or the *numeric-comp* style with abbreviations for Biblatex. Either way, the citation style is preselected. If in doubt, the Biblatex variant should be used.

> The citation and bibliographic style is not to be changed.

While BibTEX should work fine and is supported, the use of Biblatex, especially with its *biber* backend is encouraged to support proper use of Unicode characters and fonts. Collection works *must* use Biblatex. For a list of kinds of works to cite as supported by BibTEXand Biblatex refer to Table 1. Kinds of work not listed should use the *misc* type.

6 Miscellanea

```
o copyrightmark
v copyrightmark=true
v copyrightmark=false
```

6.1 Copyright metadata

By default, a copyright mark of the form "Copyright (c) 2018, HPI" is added to the metadata of the resulting PDF file. This corresponds to the option copyrightmark or copyright-mark=true. To not add the information, use copyrightmark=false.

```
o draft
v draft=true
v draft=full
o todotools
```

Table 1: Supported bibliography entry types; Default type is indicated; alias entry types in italic.

BibTeX	Biblatex	
article	article	articles in journal, magazine &c
	suppperiodical	supplemental material in periodicals
	review	reviews of other works
book	book	books
	mvbook	multi-volume —
booklet	booklet	book-like work without publisher
	collection	collection of multiple independent contributions
	mvcollection	multi-volume —
	reference	references such as dictionaries
	mvreference	multi-volume —
inbook	inbook[a]	independent part of a book
	bookinbook	part of a book that originally was a book
	suppbook	supplemental material in books
incollection	incollection	independent contribution to a collection
	suppcollection	supplemental material in a collection
	inreference	articles in works of references
inproceedings	inproceedings	articles in conference proceedings
conference	*conference*	— ditto
manual	manual	documentation works
mastersthesis	mastersthesis[b]	Master's theses
misc	misc	anything (default)
	online	online resource like web sites
	www	— ditto
	electronic	— ditto
phdthesis	phdthesis[b]	doctoral dissertation
	patent	patent entries
	periodical	complete periodical issue
proceedings	proceedings	conference proceeding
	mvproceedings	multi-volume —
	report	institutionally published report
techreport	*techreport*[c]	technical reports
	thesis	theses submitted to educational institutions
	mastersthesis	(see above)
	phdthesis	(see above)
unpublished	unpublished	works not formally published

[a] Behaves differently than BibTeX
[b] Actually a subtype of thesis
[c] Actually a subtype of report

6.2 Draft tools

To support editing early versions of reports, the `draft` or `draft=true` option can be used to activate a gray bar at the to and the bottom that says "Draft". Many LaTeX packages also react to the `draft` option. Unlike the typical effect of the `draft` option, which also disables graphics, the `hpitr` class makes sure that graphics are displayed also in the draft version. To avoid that, use `draft=full`.

The `todotools=true` option loads the `todonotes` packages (in draft mode) and provides a few additional commands.

6.3 LaTeX Packages

The following packages are automatically loaded by the `hpitr` class.

- `accsupp`
- `amsmath`
- `amssymb`
- `babel`
- `biblatex` *collections / proceedings only*
- `blindtext` *draft only*
- `booktabs`
- `color`
- `csquotes`
- `eso-pic` *draft only*
- `etoolbox`
- `expl3`
- `extdash`
- `fixltx2e` *pre-TeXLive 2015 only*
- `fontenc` *pdfTeX only*
- `fontspec` *LuaTeX/XᴇTeX only*
- `graphicx`
- `grffile`
- `hypcap`
- `hyperref`
- `hyperxmp`
- `hyphsubst` *pdfTeX only*
- `ifdraft`
- `ifluatex`
- `ifthen`

- `ifxetex`
- `inputenc`
- `longtable`
- `ltxcmds`
- `luatex85` *since TeXLive 2016, LuaTeX only*
- `mathcomp`
- `mathpazo` *pdfTeX only*
- `microtype`
- `pdfpages` *proceedings only*
- `ragged2e` *collections / proceedings only*
- `relsize`
- `scrbase`
- `scrhack`
- `scrlayer-scrpage`
- `siunitx`
- `sourcecodepro`
- `sourcesanspro`
- `tabularx`
- `textcomp`
- `tocbasic`
- `todonotes` *draft only*
- `xcolor`
- `xparse`
- `xspace`

The following packages *must not* be loaded.

- `SIstyle`
- `SIunits`

- `a4wide`
- `a4`

- aecompl
- ae
- caption2
- cite *in collections*
- courier
- doublespace
- epsfig
- epsf
- euler
- eulervm
- fancyhdr
- fancyheadings
- fourier
- geometry
- glossary
- helvet
- isolatin

- mathpple
- mathptmx
- mathptm
- newtxmath
- newtxtext
- palatino
- psfig
- pslatex
- scrpage
- subfigure
- subfig
- t1enc
- times
- umlaut
- utopia
- zefonts

7 Troubleshooting

7.1 Biber

Biber may complain about "missing files", such as

```
read_file '⟨a path⟩/recode_data.xml' - sysopen: No such file or
        directory at ⟨another path⟩/bda77484.pm line 112.
```

The reason for this error is the Biber's cach directory is corrupted. This is unfortunate but not problematic. The location of Biber's cache directory can be obtained with `biber -cache`. Just deleting this directory should resolve this error. Biber's next run will just be a little bit slower.

Index

Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the definition; numbers in roman refer to the pages where the entry is used.