




Creating a report using INBOmd

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Where to find documentation

- ▶ Documentation on INB0md
 - ▶ <https://inbo.github.io/inbomd>
- ▶ Example code using INB0md
 - ▶ <https://inbo.github.io/inbomd-examples>
 - ▶ Do have a look at our [tips and tricks for the pdf version](#)
- ▶ bookdown: Authoring Books and Technical Documents with R Markdown
 - ▶ <https://bookdown.org/yihui/bookdown/>
- ▶ R Markdown: The Definitive Guide
 - ▶ <https://bookdown.org/yihui/rmarkdown/>



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Install requirements

Install tinytex

```
update.packages(ask = FALSE, checkBuilt = TRUE)
if (length(find.package("tinytex", quiet = TRUE)) == 0) {
  install.packages("tinytex")
  tinytex::install_tinytex()
}
```

- ▶ tinytex is only required for pdf output
- ▶ tinytex is not compatible with MikTeX, uninstall MikTeX first

Install INBOmd

```
options(repos = c(
  inbo = 'https://inbo.r-universe.dev',
  CRAN = 'https://cloud.r-project.org'))
install.packages("INBOmd")
# setup for tinytex
tinytex::tlmgr_install(c(
  'inconsolata', 'times', 'tex', 'helvetic', 'dvips'
))
tinytex::tlmgr_conf(
  c("auxtrees", "add", system.file("local_tex", package = "INBOmd"))
)
tinytex::tlmgr_install(c("hyphen-dutch", "hyphen-french"))
```



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Getting started

Important things to know about bookdown

- ▶ There must be at least a file named `index.Rmd`
 - ▶ This contains the YAML header
 - ▶ It must contain at least one header 1 (#)
 - ▶ Pro tip: place your summary or introduction in `index.Rmd`
- ▶ You can split long documents over multiple `.Rmd` files
 - ▶ Add only a YAML to the `index.Rmd`
 - ▶ All `.Rmd` files will be glued into a single `.Rmd` when rendering the document
 - ▶ Except files starting with `_`
 - ▶ Their order: `index.Rmd` + other files in alphabetical order
 - ▶ Pro tip: start the filenames with a number indicating the order

Starting a new document

- ▶ Open RStudio
- ▶ Choose File > New File > R Markdown
- ▶ Select 'From Template' and select 'INBO rapport'
- ▶ Enter the name for your report, select its main directory and press 'OK'
 - ▶ This creates name/name.Rmd in the selected directory
 - ▶ Rename name/name.Rmd to name/index.Rmd in the Files window of RStudio
- ▶ Choose File > New Project > Existing directory, select name and press 'Create project'
- ▶ Open _bookdown.yml in this project and update book_filename and output_dir
- ▶ Open index.Rmd in this project and update the YAML header

Covertng an existing RMarkdown document

- ▶ Start a new Bookdown document
- ▶ Copy-paste the relevant code from the existing document to the new document
- ▶ Try this using your own RMarkdown document

The setup chunk

- ▶ The setup chunk is the best location to load packages
- ▶ `opts_chunk$set()` defines the default options for each chunk
 - ▶ You can override these in an individual chunk
 - ▶ `fig.width` and `fig.height` are defined in inches
 - ▶ `fig.width = 150 / 25.4` defines the plot width to be 150 mm (5.91 in)
- ▶ `theme_set()` and `interactive()`
 - ▶ Sets a default INBO theme for `ggplot2`
 - ▶ pdf output uses a smaller font size for the `ggplot2` graphics
 - ▶ You can use the Flanders Art Sans font if it is installed on your computer



Building the report

- ▶ Use the Build Book button instead of the Knit button
 - ▶ You can find this button in the same window as Environment and History
- ▶ Open the dropdown menu to select the required output format
 - ▶ Defaults to **all** formats listed in the YAML
 - ▶ Pro tip: select a **single** format while working on the document
- ▶ Try this with your first Bookdown document



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Figures in bookdown

Figure basics

Chunk setup

- ▶ One plot = one chunk
- ▶ Give the chunk a relevant name
 - ▶ Only alphanumeric characters (a-z, A-Z, 0-9), slashes (/), or dashes (-)
 - ▶ Chunk names must be unique

Reference a figure

- ▶ Syntax: `\@ref(fig:the-chunk-name)`
- ▶ This will render the figure number and a hyperlink to the caption
- ▶ Works only if the figure has a caption

Add an external figure

- ▶ Create an R chunk
- ▶ Add `knitr::include_graphics("path-to-figure.png")`

Add a caption

- ▶ Plain text caption without special characters (`%`, `_`)
 - ▶ Chunk option: `fig.cap = "Place your caption here"`
- ▶ Special characters or Markdown syntax
 - ▶ Use text references
 - ▶ Outside of chunk:
 - ▶ `(ref:label)` This figure caption `_works_ 100%`!
 - ▶ Must be a single line
 - ▶ At least 1 blank line above and below
 - ▶ Chunk option: `fig.cap = "(ref:label)"`
 - ▶ `label` must be a unique name in the document
 - ▶ Pro tip: use the chunk name as `label`



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Tables in bookdown

Tables

- ▶ Chunk setup identical to chunk setup for figures
- ▶ First try `knitr::kable()` to generate the table
 - ▶ See [examples](#) on the INBOmd website
 - ▶ Improve formatting with `kableExtra`
- ▶ `knitr::kable(caption = "My table caption")`
 - ▶ Text references (`ref:label`) are possible too
- ▶ Reference the table with `\@ref(tab:the-chunk-name)`



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Citing literature

Setting up the YAML

- ▶ Add bibliography: `your-bibliography.bib` to the YAML header
 - ▶ Must have `.bib` extension
 - ▶ Name contains only letters, digits and dash (-)
- ▶ Must be in bibtex format
- ▶ Add the code below to add a title for the references in HTML or EPUB (not necessary for PDF)

```
`r if (knitr::is_html_output()) '# References {-}'`
```

Inserting citations manually

- ▶ `[@bibtex-key]` for the notation with parantheses (Agresti, 2002)
- ▶ `@bibtex-key` for the notation without parantheses Amano (2012)
- ▶ Use a semi-colon to separate citations
 - ▶ `[@bibtex-key; @bibtex-key2; @bibtex-key3]` (Anselin *et al.*, 2014; Banerjee *et al.*, 2003)
- ▶ Create a sensible key for each reference in your bibliography
 - ▶ Key must contain only letters, digits, dashed and colons
 - ▶ Edit the bibliography using RStudio or JabRef

Inserting citations using citr addin

- ▶ `install.packages("citr")`
- ▶ Go to “Addins” in the RStudio toolbar
- ▶ Select “CITR”, “Insert citations”
- ▶ Search and select the references you want
- ▶ Insert the citations

Using Zotero through citr addin

- ▶ Install “Zotero” and “Better bibtex” plugin
- ▶ Start Zotero
- ▶ Go to “Addins” in the RStudio toolbar
- ▶ Select “CITR”, “Insert citations”
- ▶ Connect to Zotero
- ▶ Go to “Settings” tab
- ▶ Add references to local bibliography file



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Miscellaneous

Footnotes

- ▶ My sentence with a footnote¹[footnote text].
- ▶ My sentence with a footnote¹.
- ▶ Use [[^]footnote-label]: footnote text to define the footnote in a separate paragraph².
 - ▶ [[^]example]: This an example of a reusable footnote.
- ▶ These footnotes are reusable³.
 - ▶ Note that reusing a footnote⁴ adds a copy of the footnote.

¹footnote text

²This an example of a reusable footnote.

³This an example of a reusable footnote.

⁴This an example of a reusable footnote.



Equations

- ▶ Equations are based on [LaTeX code](#).
- ▶ [Online editor](#)
- ▶ Code between single \$ results in an inline equation $\sum_{i=1}^n x_i$
- ▶ Code between double \$ results in a stand alone equation

$$\sum_{i=1}^n x_i$$

- ▶ Code between `\begin{equation}` and `\end{equation}` and with a label (`\#eq: sum`) is stand alone and numbered

$$\sum_{i=1}^n x_i \tag{1}$$

Cross references

- ▶ Figures: `\@ref(fig:chunk-name)`
- ▶ Tables: `\@ref(tab:chunk-name)`
- ▶ Equations: `\@ref(eq:equation-label)`
- ▶ Headings
 - ▶ Label the heading by adding (`#my-label`) at the end
 - ▶ `\@ref(my-label)`
 - ▶ Pro-tip: use a prefix to indicate the heading level
 - ▶ `# Introduction (#ch:introduction)`
 - ▶ `## Conclusion (#s:executive-conclusion)`

Boxes

- ▶ Open the dropdown menu 'Addins' for the RStudio toolbar
- ▶ Look for the INBOmd package⁵
- ▶ Choose insert 'block', insert 'alertblock' or insert 'exampleblock'
- ▶ Boxes can have an optional title
 - ▶ Works only with pdf output!



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Adding introduction chapters

- ▶ Add {-} at the end of the header to make it an unnumbered header
- ▶ For pdf only
 - ▶ Place \mainmatter at the position where the table of contents should go
 - ▶ The default language is Dutch
 - ▶ Place English text between \benglish and \eenglish
 - ▶ Place French text between \bfrench and \efrench

```
# Voorwoord {-}
```

```
\benglish
```

```
# English abstract {-}
```

```
\eenglish
```

```
\mainmatter
```



Adding appendices

For pdf only

- ▶ Insert `\appendix`
- ▶ The bibliography will be placed before the appendices
- ▶ Chapters in the appendix get letters instead of numbers

Other output formats ignore `\appendix`

- ▶ The bibliography will be placed at the end of the document
- ▶ Appendix chapters will get a continuing number





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Using templates within a document

knit_expand concept

- ▶ Create a template with template tags
- ▶ Create Rmarkdown through find and replace the template tags with a value
- ▶ Repeat for each value
- ▶ Combine and knit the resulting Rmarkdown

Creating the template

- ▶ Start by creating a regular Rmarkdown subdocument
- ▶ Use a name starting with underscore (_)
- ▶ Create a template tag by placing it between double curly brackets {{ and }}.
- ▶ Pro tips:
 - ▶ Use a single template tag
 - ▶ Use that single template tag to select relevant data
 - ▶ Add the template tag to the chunk to create unique chunk names

Example template

```
```{r mt-{{id}}-setup}
if (interactive()) {
 this_id <- sample(mt$id, 1)
} else {
 this_id <- "{{id}}"
}
selection <- filter(mt, id == this_id)
```

## `r selection$title[1]`

```{r mt-{{id}}-plot, fig.cap = selection$caption[1]}
ggplot(selection, aes(x = year, y = value)) + geom_point()
```
```


Handle the template

- ▶ Chunk option results must be “asis”
- ▶ Call `knit_expand()` on each value of the template tag
 - ▶ The example will replace every `{{id}}` from the template with a value from `to_do`
- ▶ `knit_expand()` only does the ‘find and replace’
- ▶ `knit()` actually runs the Rmarkdown code created by `knit_expand()`

```
```${r display-monthly-totals, results = "asis"}
to_do <- unique(mt$id)
rmd <- sapply(
 to_do,
 function(id) {
 knit_expand("_monthly_totals.Rmd", id = id)
 }
)
rmd <- paste(collapse = "\n\n")
cat(knit(text = rmd, quiet = TRUE))
```
```

Agresti A. (2002). Categorical Data Analysis. John Wiley and Sons, Hoboken,

New Jersey

Amadio T. (2012) Unravelling the dynamics of organisms in a changing world using ecological modelling. Ecological Research 27 (3): 495–507.

<http://dx.doi.org/10.1007/s11284-012-9222-6>