A tutorial by Yan Holtz, Florian Rohart & Baptiste Couvy-Duchesne

Introduction to R Markdown

Or how to boost reproducibility in your research

bit.ly/2SxJFlV

Brisbane, Australia, December 2018

What

" An R Markdown (.Rmd) file is a record of your research. It contains the **code** that a scientist needs to reproduce your work along with the **narration** that a reader needs to understand your work. "
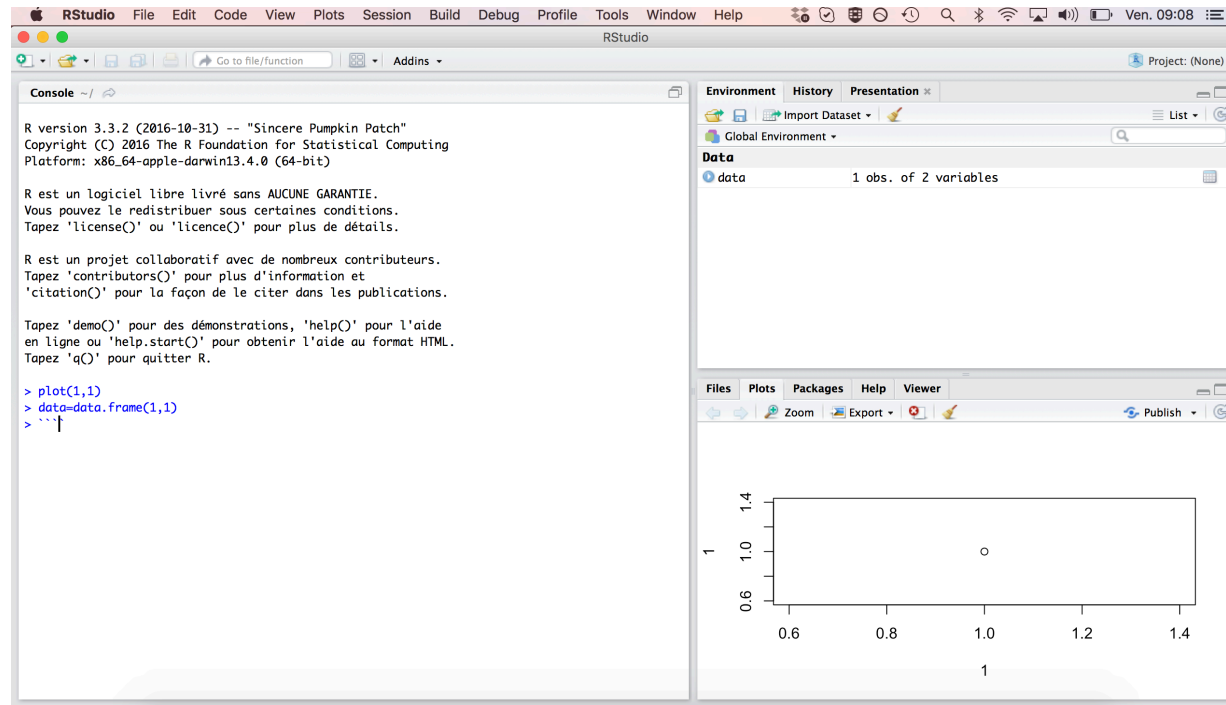
Why

- Efficiency
- Reproducibility
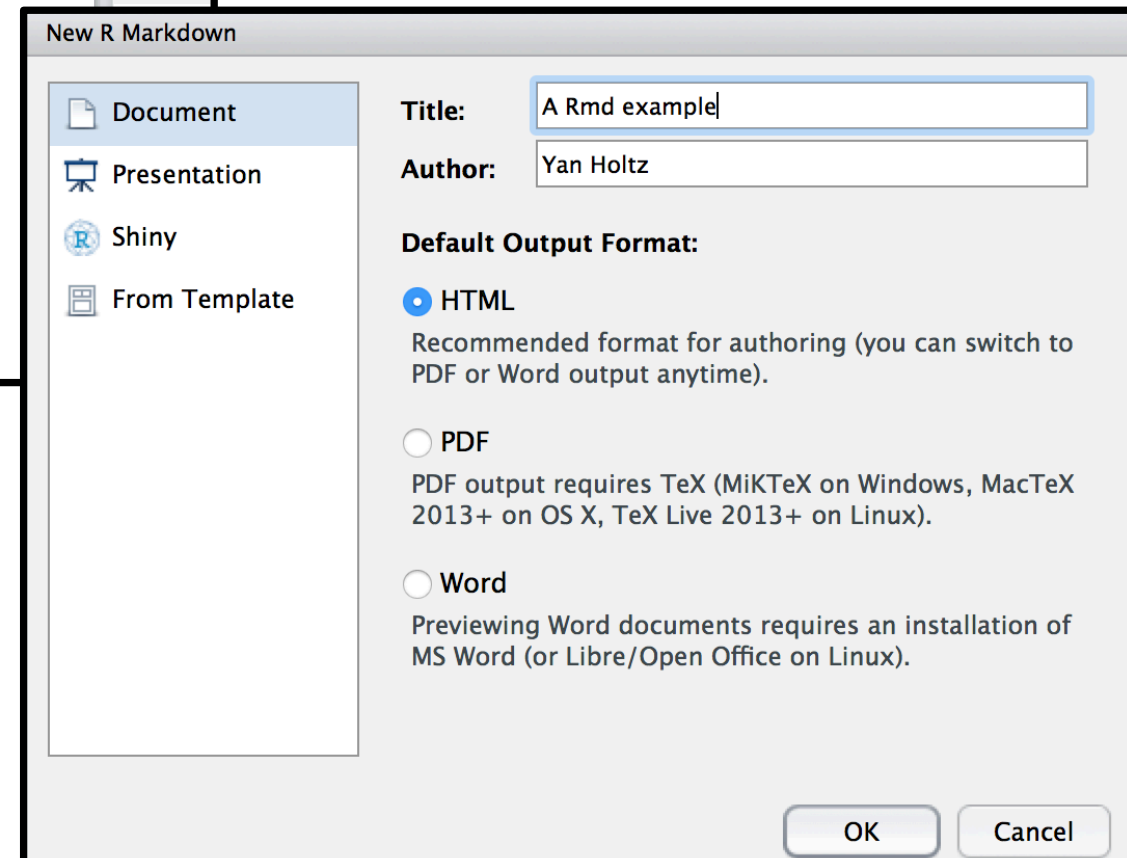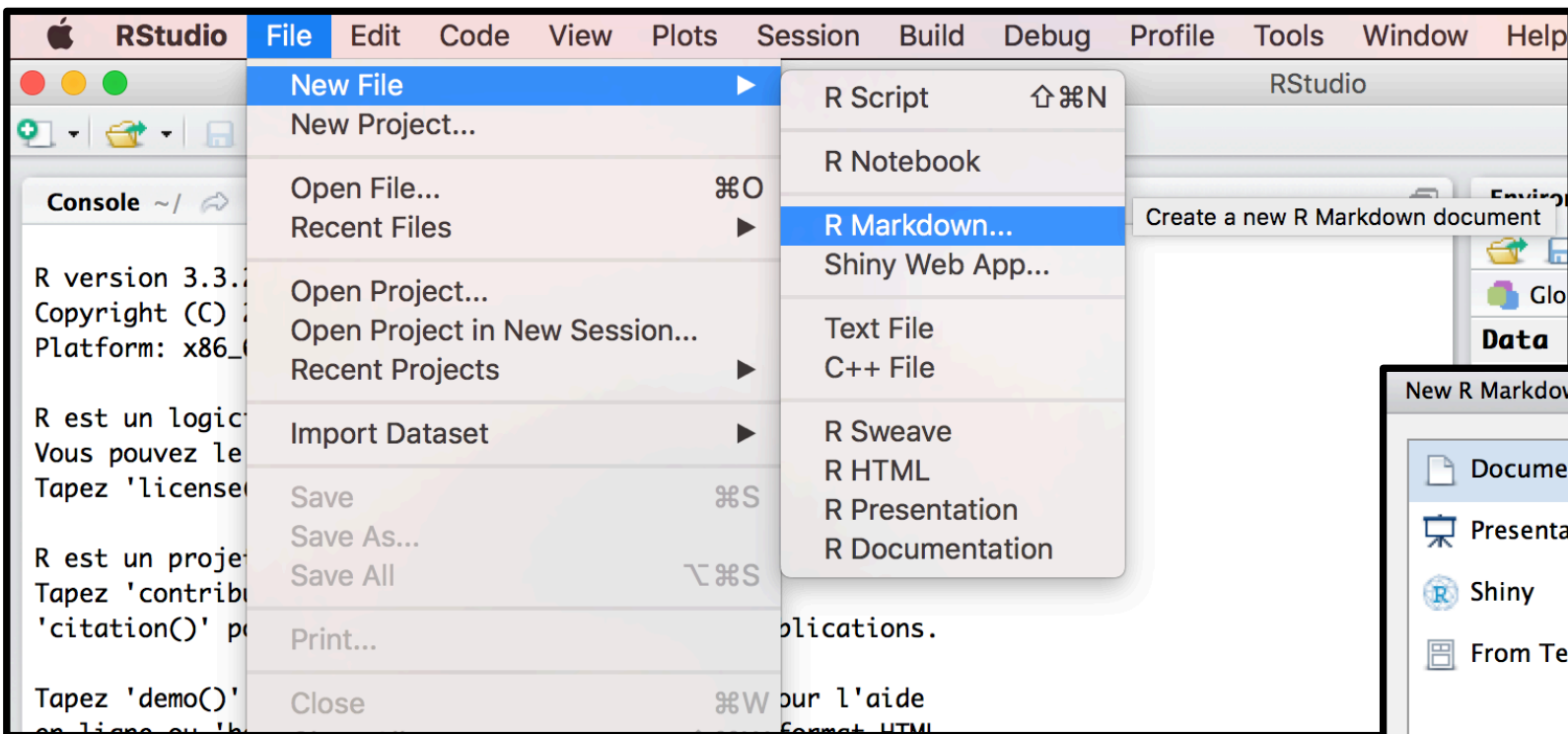- Interactivity
- Automation
- Notebook
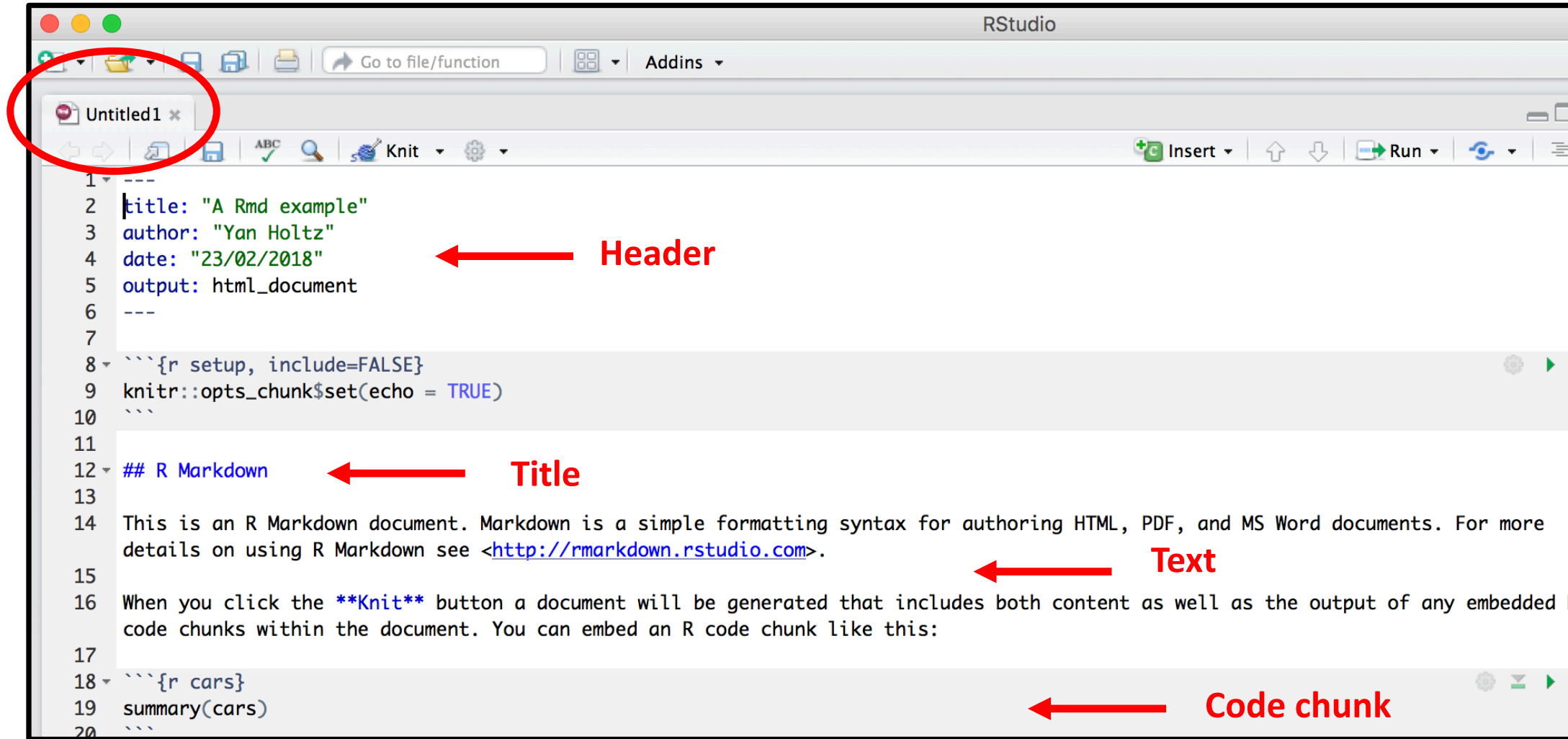
And much more..

Most Basic Document

1 - Open R studio:

- User Friendly environment
- Auto completion
- Run a line of code with Cmd + Enter

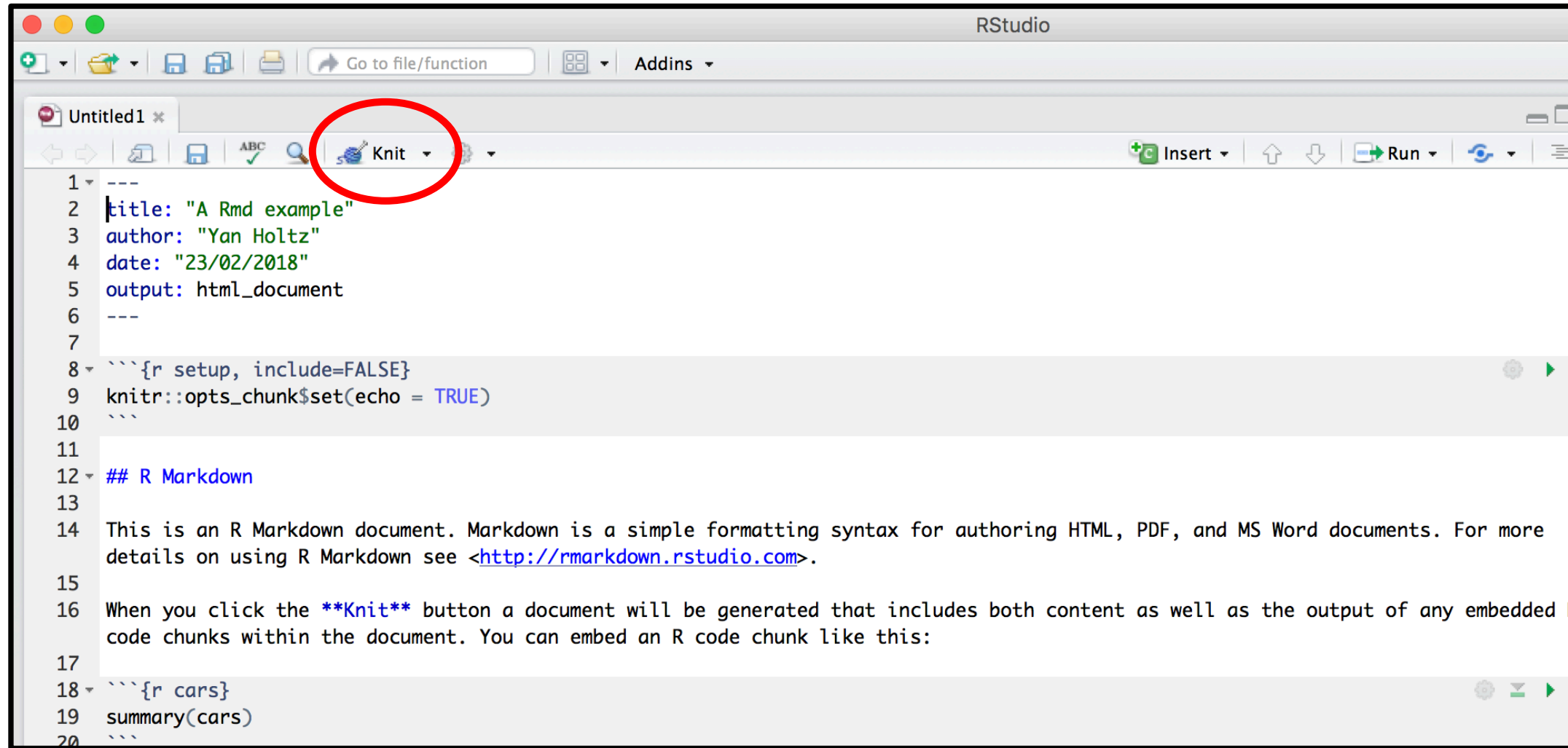# 2 - Open a .Rmd file:

Anatomy of a .Rmd file:

3 - Knit the .Rmd file:

4 - .HTML output is ready

- Have a look to your current directory

- Open the .html in a browser

Bureau logo_full_fdtv
My_first_RMD.html ← .html
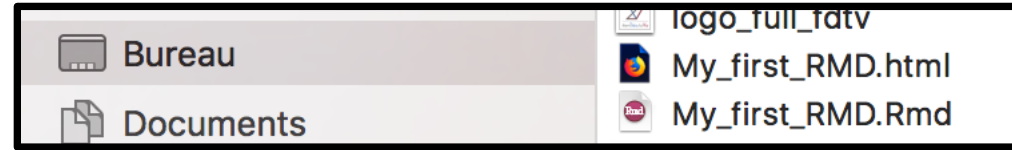
Documents
My_first_RMD.Rmd ← .rmd

A Rmd example

Yan Holtz ← header

23/02/2018

R Markdown ← Title

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com. ← Text

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```
← Code

```
##     speed          dist
## Min.   : 4.0   Min.   :  2.00
## 1st Qu.:12.0   1st Qu.: 26.00
## Median :15.0   Median : 36.00
## Mean   :15.4   Mean   : 42.98
## 3rd Qu.:19.0   3rd Qu.: 56.00
## Max.   :25.0   Max.   :120.00
```
← Code result

Including Plots

You can also embed plots, for example:

Customize text

Customize the text

R Markdown cheat sheet

bit.ly/1SuNTo9

Code chunk options

Anatomy of a Code chunk:

Run all previous chunks

Run this chunk

R, bash, python?

Optional: chunk name

Chunk options

```
17
18   ```{r cars, eval=TRUE, warning=FALSE}
19   # Load a library
20   library(tidyverse)
21
22   # make a plot
23   mtcars %>%
24     ggplot( aes(x=mpg, y=disp)) +
25       geom_point()
26   ```
```

Comment your code

Code chunk options:

option	default	effect
eval	TRUE	Whether to evaluate the code and include its results
echo	TRUE	Whether to display code along with its results
warning	TRUE	Whether to display warnings
error	FALSE	Whether to display errors
message	TRUE	Whether to display messages
tidy	FALSE	Whether to reformat code in a tidy way when displaying it
results	"markup"	"markup", "asis", "hold", or "hide"
cache	FALSE	Whether to cache results for future renders
comment	"##"	Comment character to preface results with
fig.width	7	Width in inches for plots created in chunk
fig.height	7	Height in inches for plots created in chunk

Do not always run the whole document

→ R Markdown document is a Notebook !!

Header

Anatomy of the header:

```
---
title: "A Rmd example"
author: "Yan Holtz"
date: "23/02/2018"
output:
  html_document:
    toc: TRUE
    code_folding: "hide"
    number_sections: TRUE

---
```

Code ▾

A Rmd example

Yan Holtz

23/02/2018

- 1 R Markdown
  - 1.1 Sub1
  - 1.2 Sub2
- 2 Including Plots

1 R Markdown

1.1 Sub1

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com.

1.2 Sub2

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

Code

400 -
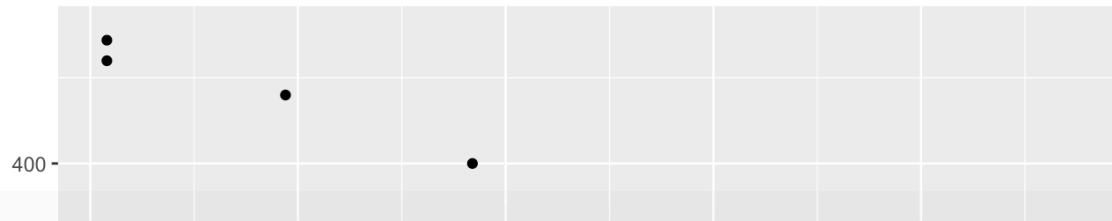
Going further

Insert a table: the DT library

```{r}
library(DT)
datatable(mtcars, rownames = FALSE, filter="top", options = list(pageLength = 5, scrollX=T) )
```

Data frame

Show [5 ⌄] entries   Search: [   ]

mpg ⇕	cyl ⇕	disp ⇕	hp ⇕	drat ⇕	wt ⇕	qsec ⇕	vs ⇕	am ⇕	gear ⇕
[ ]	[ ]	[ ]	[ ]	[ ]	[⊗]	[ ]	[ ]	[ ]	[ ]
					2.751 5.424				
6	160	110	3.9	2.875			1	4	4
6	258	110	3.08	3.215			0	3	1
8	360	175	3.15	3.44	17.02	0	0	3	2
6	225	105	2.76	3.46	20.22	1	0	3	1
8	360	245	3.21	3.57	15.84	0	0	3	4

Showing 1 to 5 of 23 entries (filtered from 32 total entries)   Previous [1] 2 3 4 5 Next
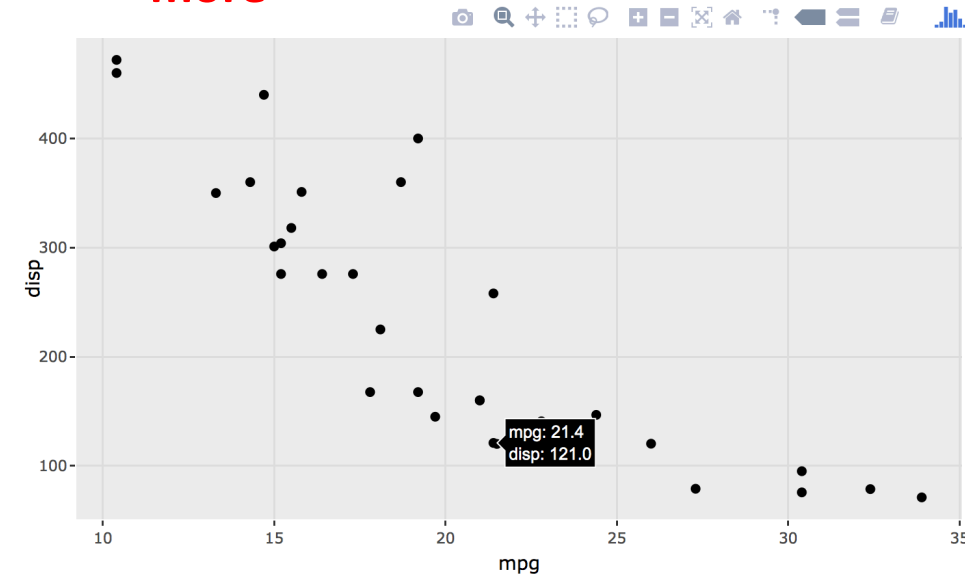
Use Interactive charts

```{r, warning=FALSE, message=FALSE}
# Load a library
library(ggplot2)
library(plotly)       ← Plotly library

# make a static plot with ggplot2
p <- mtcars %>%
  ggplot( aes(x=mpg, y=disp)) +
    geom_point()      ← Basic ggplot2 graphic

# turn it interactive with plotly
ggplotly(p)           ← Ggplotly turn the plot interactive
```
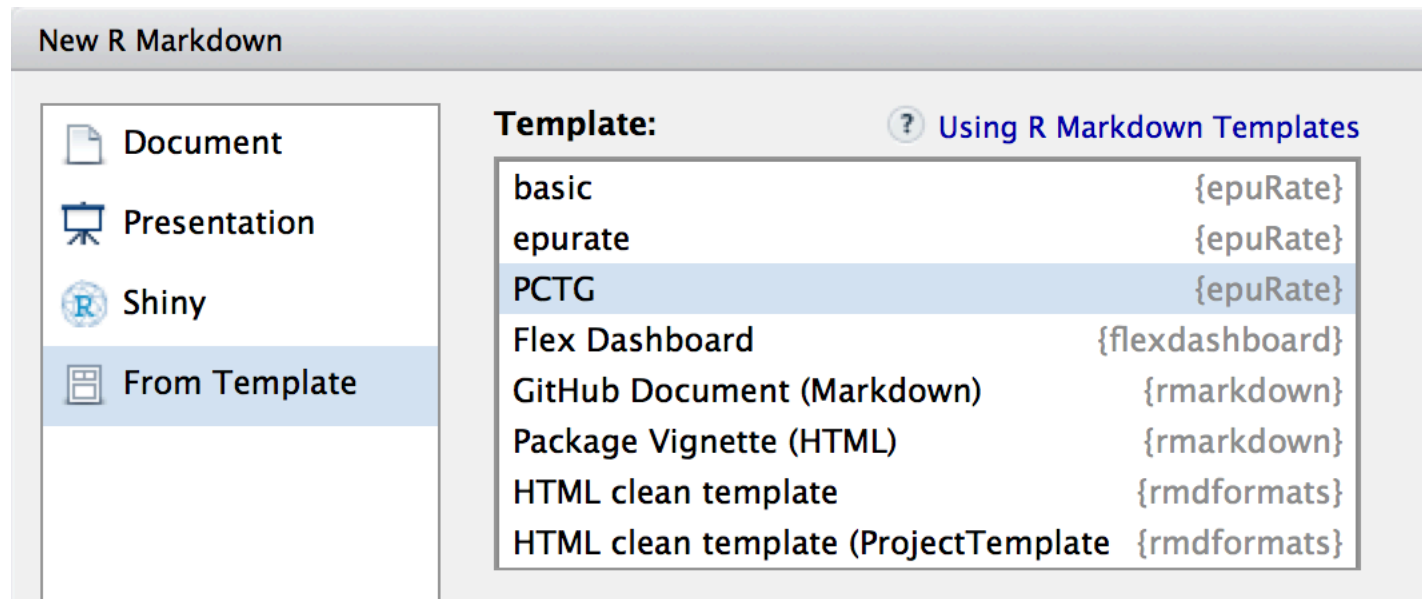
Result: zoom / hover / export .. And more

http://www.htmlwidgets.org

Use a template

- The PCTG template: www.github.com/holtzy/epuRate

```
library(devtools)
install_github("holtzy/epuRate")
library(epuRate)
```
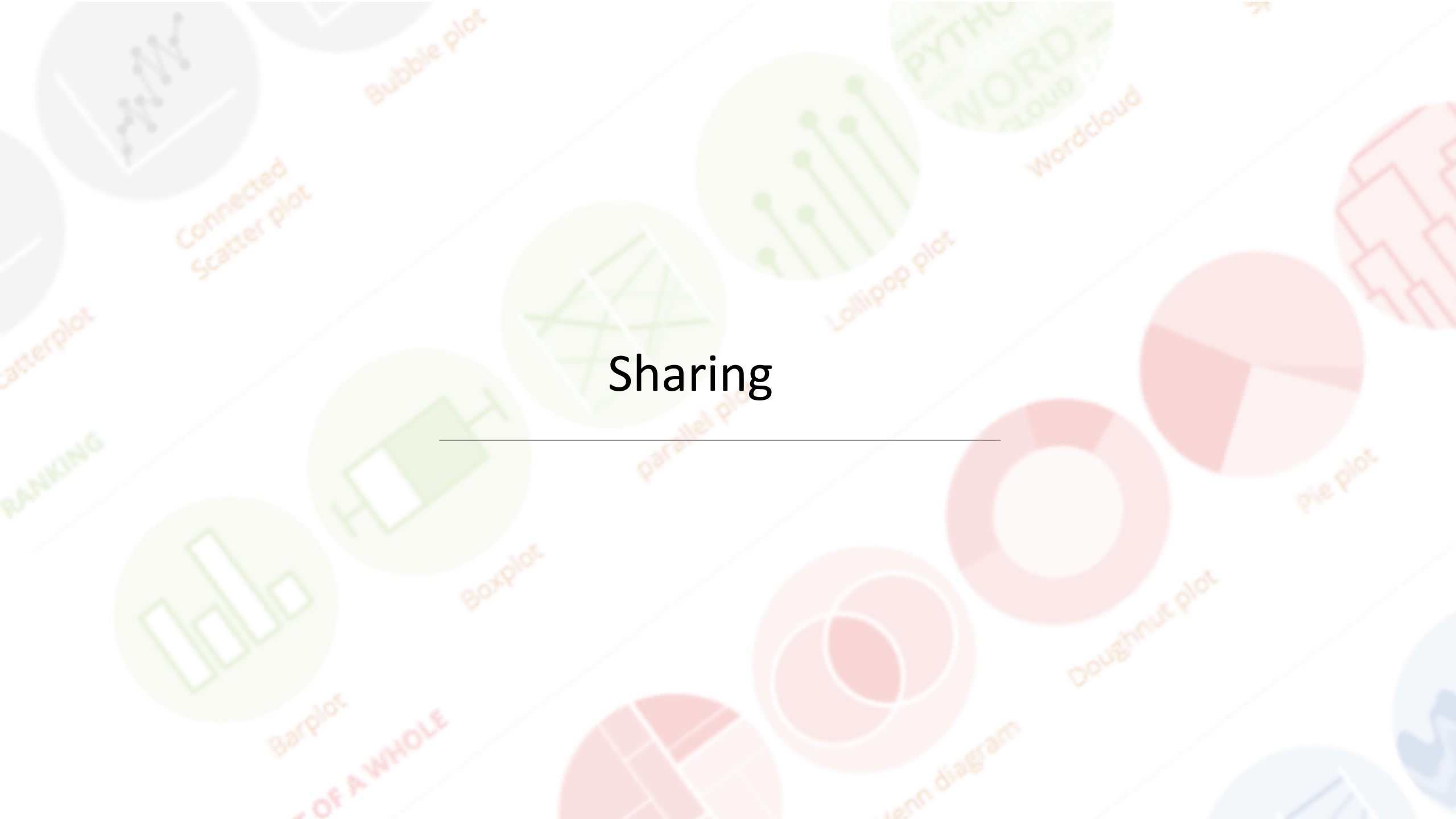
Pimp my .Rmd
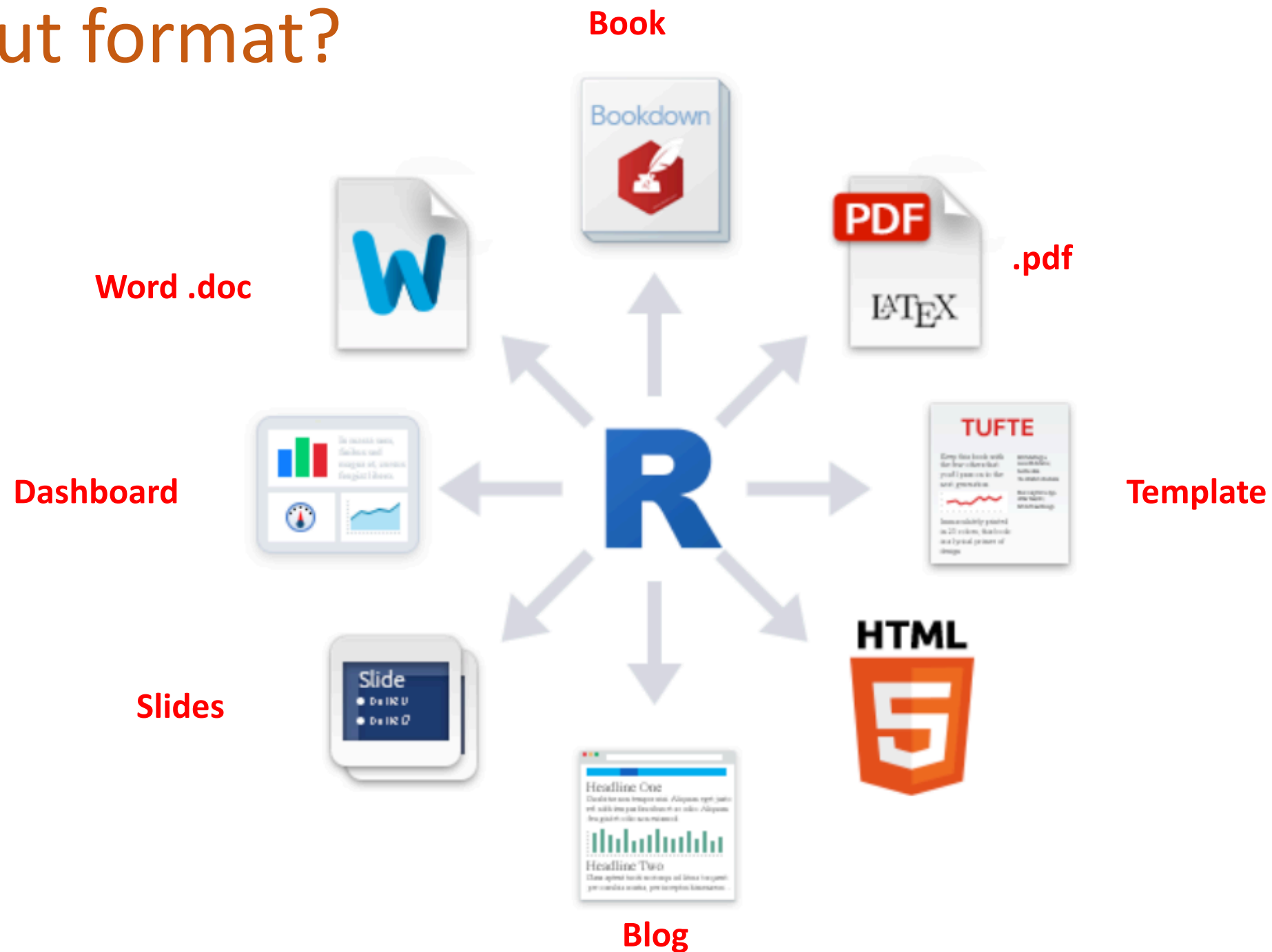
- holtzy.github.io/Pimp-my-rmd/

- Everything is possible

- Use CSS and HTML code

- Add header and footer

- More

Sharing

Output format?

Book

Word .doc

.pdf

Dashboard

Template

Slides

Blog

HTML

Share your analysis

- Mail with colleagues, supervisor

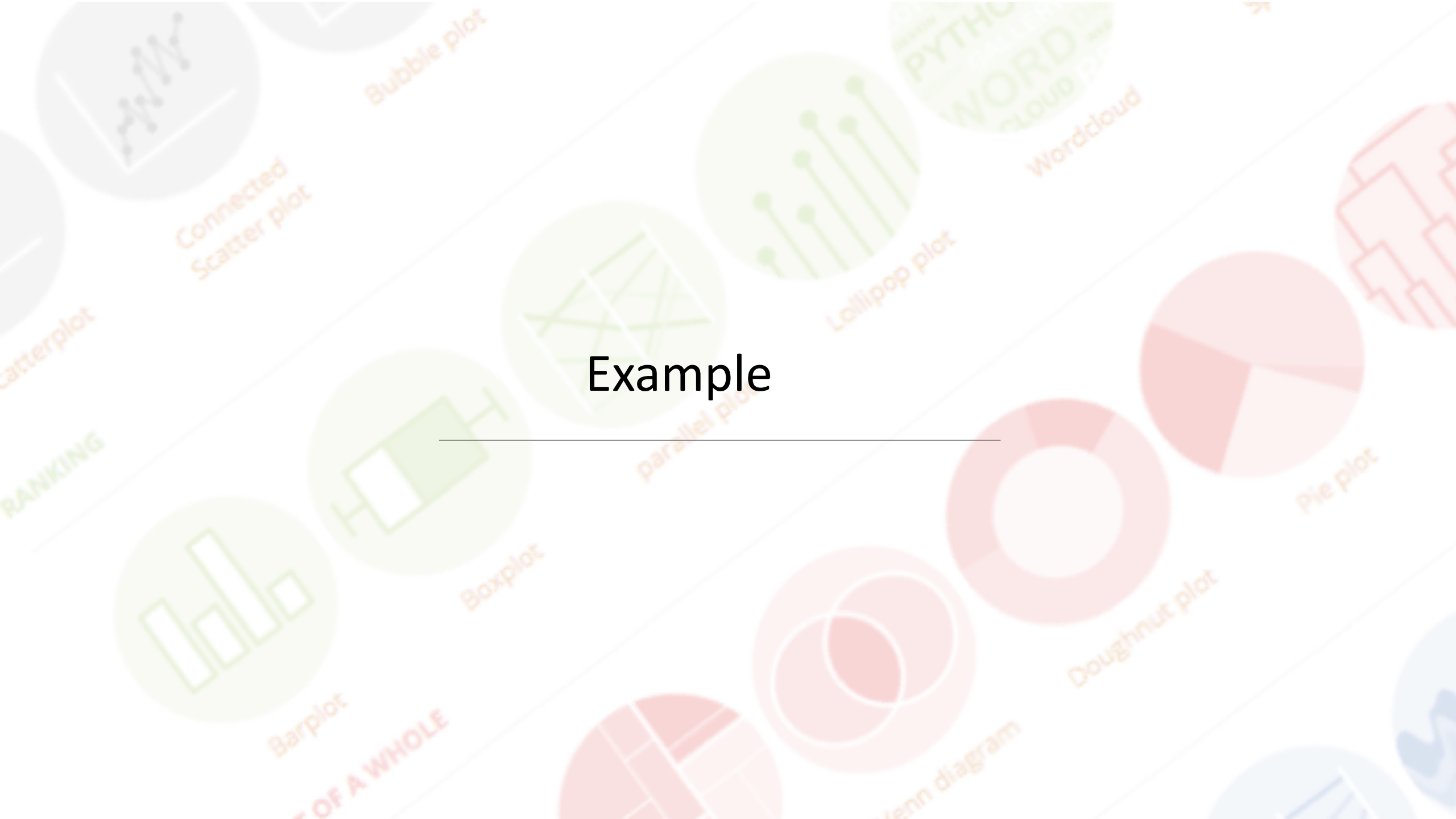- Publication as a supplementary material

- Github: www.github.com

- Website

Example

An example: my bioinfo pipeline:

- Interaction with clusters

- One unique folder

- Several .rmd wrapped in a website

- Shared online

Thanks

Slides: bit.ly/2SxJFlV

Cheat Sheet: bit.ly/2AZySd9

Pimp my rmd: bit.ly/2QDX7Hz

✉ Yan.holtz.data@gmail.com

🏠 www.yan-holtz.com

🐦 @R_Graph_Gallery

github.com/holtzy