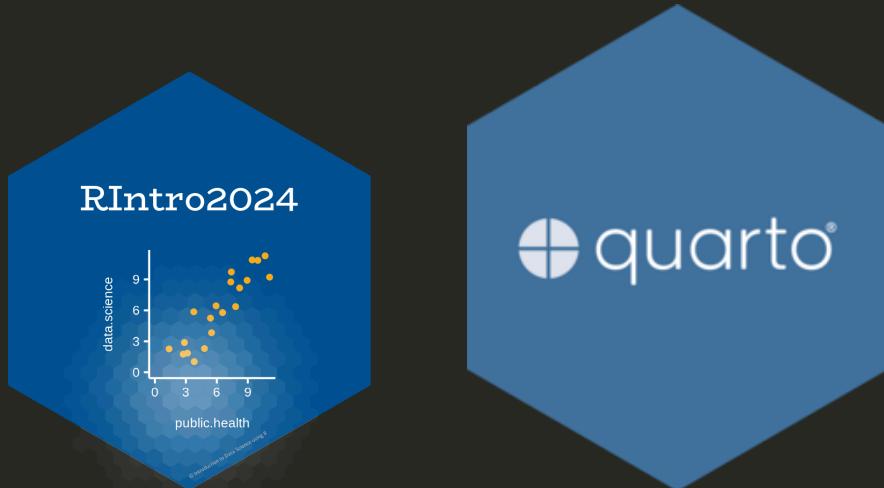


Communicating Research with Quarto



Dr. Arun Mitra

AMCHSS, SCTIMST



What is Quarto?

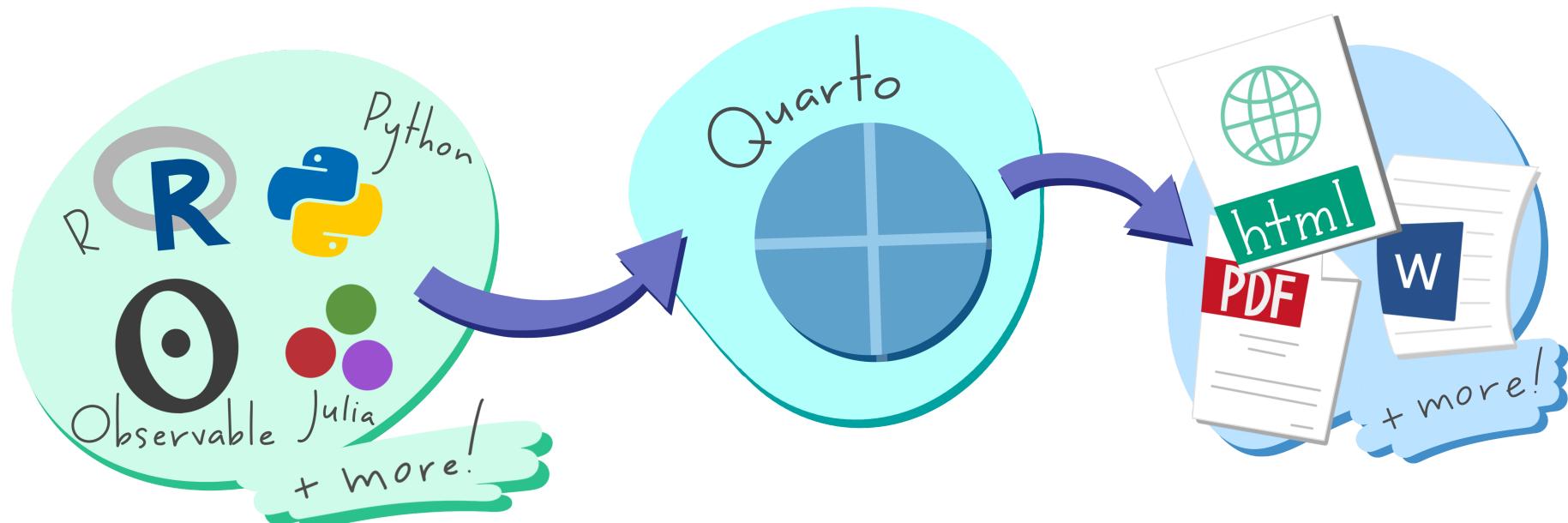
Quarto is a file format for making dynamic documents with R.

A Quarto document is written in markdown (an easy-to-write plain text format) and contains chunks of embedded R code

Quarto provides an unified authoring framework for data science, combining your code, its results, and your prose commentary.

Quarto documents are fully reproducible and support dozens of output formats, like PDFs, Word files, slideshows, and more.

What is Quarto?



Need some help?

- Download Quarto: <https://quarto.org/docs/get-started/>
- Quarto Guide: <https://quarto.org/docs/guide/>
- Markdown Reference Sheet: *Help > Markdown Quick Reference*

You'll need the Quarto Command Line Interface but it is automatically done by RStudio for you.

To create a new Quarto document (.qmd), select *File -> New File -> Quarto Document* in RStudio, then choose the file type you want to create. For now we will focus on a .html Document, which can be easily converted to other file types later.

It contains three important types of content:

- An (optional) YAML header surrounded by ---
- Chunks of R code surrounded by ` `` `
- Text mixed with formatting like ## headings and simple text.

Components of a Quarto Document

The screenshot illustrates the components of a Quarto document, showing the editor interface and the resulting presentation.

Editor View:

- Header:** title: "Hello, Quarto", format: html, editor: visual
- Code Block:** {r}
#| label: load-packages
#| include: false

library(tidyverse)
library(palmerpenguins)
- Section Headers:** Meet Quarto, Meet the penguins
- Text:** Quarto enables you to weave together content and executable code into a finished document. To learn more about Quarto see <https://quarto.org>.
- Image:** A decorative illustration of three penguins (Chinstrap, Gentoo, Adélie) standing on colored spots (purple, teal, orange).
- Code Block:** {r}
#| label: plot-penguins

Presentation View:

- Title:** Hello, Quarto
- Section Headers:** Meet Quarto, Meet the penguins
- Text:** Quarto enables you to weave together content and executable code into a finished document. To learn more about Quarto see <https://quarto.org>.
- Image:** The same decorative illustration of three penguins (Chinstrap, Gentoo, Adélie) standing on colored spots (purple, teal, orange).
- Figure:** A scatter plot titled "Flipper and bill length Dimensions for penguins at Palmer Station LTER". The x-axis is "Bill length (mm)" and the y-axis is "Flipper length (mm), both ranging from 50 to 60. The plot shows data points for three species: Adelie (blue diamonds) and Chinstrap (orange triangles). A legend indicates "Penguin species" with "Adelie" represented by a blue diamond and "Chinstrap" by an orange triangle.

YAML Header

Defines the metadata

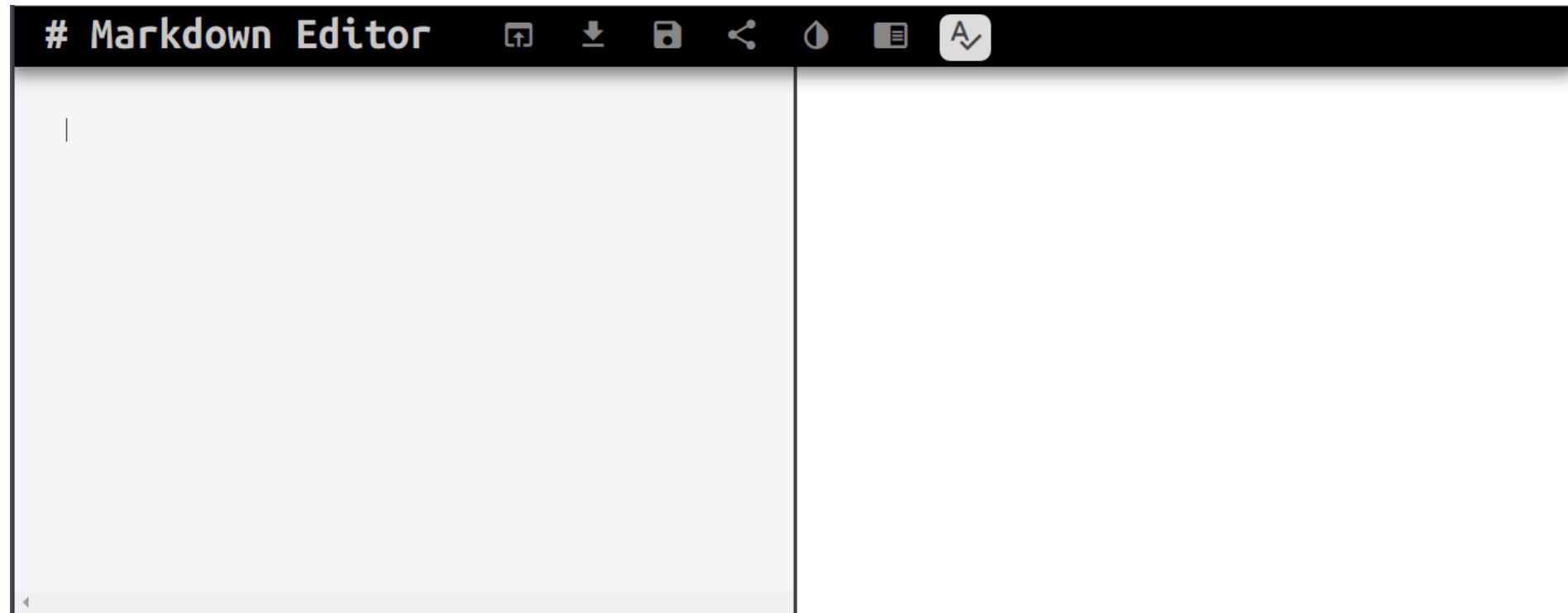
Defines the output format

Defines options of the output format

```
---
```

```
title: "First Example"
author: "Arun Mitra"
date: today
output: html
toc : true
---
```

Markdown is Cool



Basic Markdown Syntax

The image shows a side-by-side comparison of an R Markdown file and its resulting HTML output.

Left Panel (R Markdown Editor):

- The title bar says "example.Rmd".
- The toolbar includes icons for back/forward, file operations, ABC, search, and "Knit HTML".
- The code area contains the following R Markdown code:

```
1 # Header 1
2
3 This is an R Markdown document. Markdown is a
4 simple formatting syntax for authoring webpages.
5
6 Use an asterisk mark to provide emphasis, such
7 as *italics* or **bold**.
8
9 - Item 1
10 - Item 2
11 - Item 3
12
13 ``
14 Use back ticks to
15 create a block of code
16 ``
17
18 Embed LaTex or MathML equations,
19 $\frac{1}{n} \sum_{i=1}^n x_i$
```

Right Panel (Generated HTML):

- The title bar says "~/Desktop/example.html".
- The toolbar includes "example.html", "Open in Browser", and a search bar.
- The content is identical to the R Markdown file, rendered as:

 - # Header 1
 - This is an R Markdown document. Markdown is a simple formatting syntax for authoring web pages.
 - Use an asterisk mark to provide emphasis, such as *italics* or **bold**.
 - Create lists with a dash:

 - Item 1
 - Item 2
 - Item 3
 - Use back ticks to create a block of code
 - Embed LaTex or MathML equations, $\frac{1}{n} \sum_{i=1}^n x_i$

Code Chunks

The knitr package extends the basic markdown syntax to include chunks of executable R code.

When you render the report, knitr will run the code and add the results to the output file. You can have the output display just the code, just the results, or both.

To embed a chunk of R code into your report, surround the code with two lines that each contain three back ticks. After the first set of back ticks, include ` `` { r }, which alerts knitr that you have included a chunk of R code.

R Chunks

Here's some code

```
```{r}  
dim(iris)
```
```



Here's some code

```
dim(iris)
```

```
## [1] 150 5
```

Chunk Options

To omit the results

To omit the results from your final report (and not run the code) add the argument `eval = FALSE` inside the brackets and after `r`. This will place a copy of your code into the report.

To omit the code

To omit the code from the final report (while including the results) add the argument `echo = FALSE`. This is very handy for adding plots to a report, since you usually do not want to see the code that generates the plot.

R Chunks

Here's some code

```
```{r eval=FALSE}  
dim(iris)
```
```



Here's some code

```
dim(iris)
```

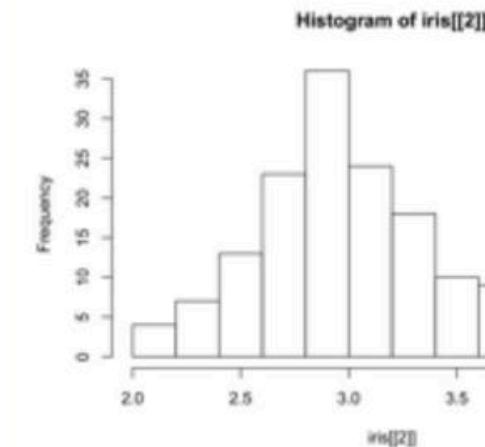
R Chunks

Here's a plot

```
```{r echo=FALSE}  
hist(iris[[2]])
```
```



Here's a plot



Inline R Code

You can also evaluate R expressions inline by enclosing the expression within a single back-tick qualified with `r`.

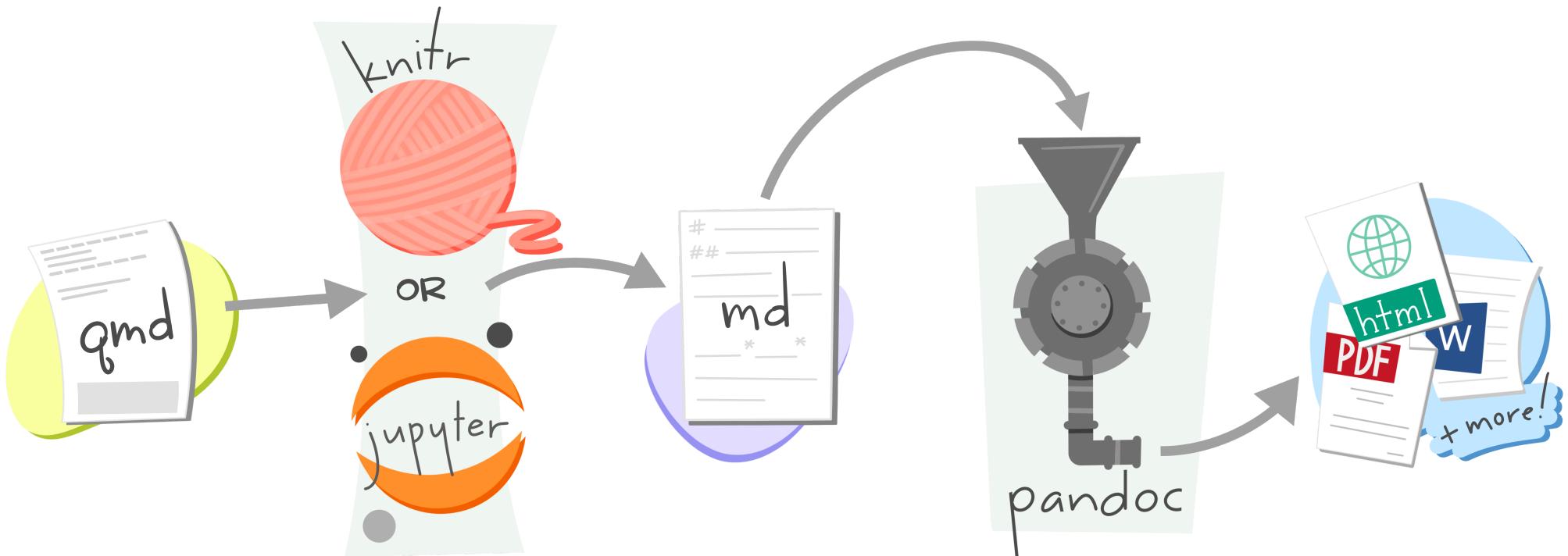
`knitr` will replace the inline code with its result in your final document (inline code is always replaced by its result). The result will appear as if it were part of the original text.

Two plus two
equals `r 2 + 2`.



Two plus two
equals 4.

How Does Quarto Work?



Conclusion

Quarto is awesome.

- The ratio of markup to content is excellent.
- For exploratory analyses, blog posts, and interactive documents
- For journal articles, though knowledge on *LATEX* / CSS / HTML will be helpful.

The RStudio team have made the whole process very user friendly.

- RStudio provides useful shortcut keys for compiling to HTML, and running code chunks.
- These shortcut keys are presented in a clear way.
- Code completion on R code chunk options is really helpful.



Questions?