Quarto

Elevating R Markdown for Advanced Publishing

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Posit PBC

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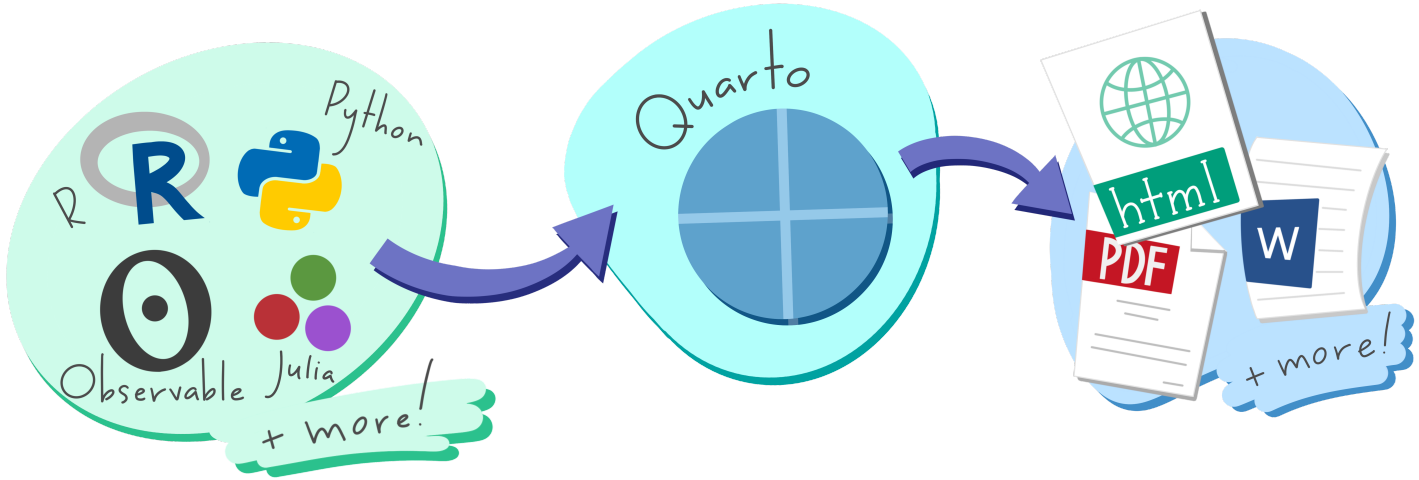
What is Quarto?

An open-source, scientific and technical publishing system

Quarto is the next generation of R Markdown

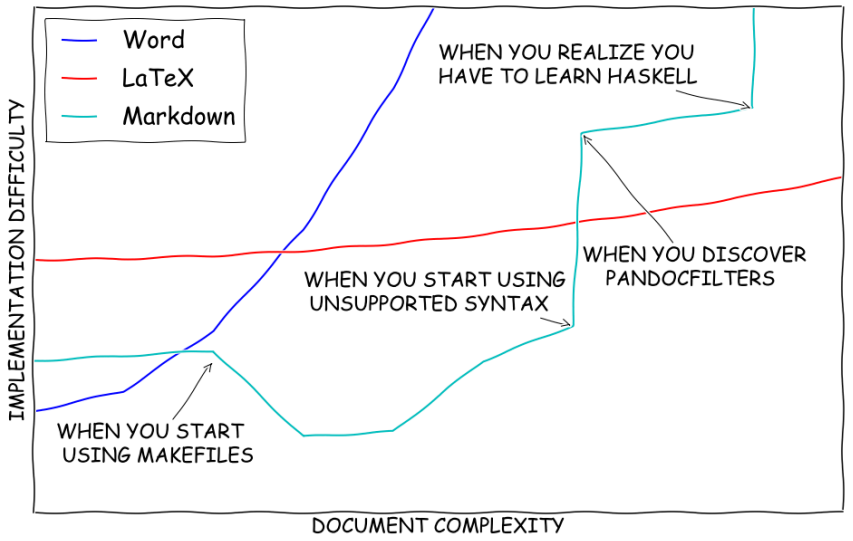
- it **unifies** and **improves** the R Markdown ecosystem
- it **extends** it for people who don't know R Markdown



Artwork from "Hello, Quarto" keynote by Julia Lowndes and Mine Çetinkaya-Rundel, presented at RStudio Conference 2022. Illustrated by Allison Horst.

Why Quarto?

- Computational Documents and Scientific Markdown made easy for Single Source Publishing
- Designed from the start as multi-engine
- An attempt to bring +10 years experience of R Markdown to everyone!



https://kdheepak.com/blog/writing-papers-with-markdown

D. Krishnamurthy, "Writing technical papers with Markdown and Pandoc," Dec. 20, 2015.

How to use Quarto?

Quarto is a command line interface (CLI) that renders plain text formats (`.qmd`, `.rmd`, `.md`) OR mixed formats (`.ipynb`/Jupyter notebook) into static PDF/Word/HTML reports, books, websites, presentations and more.

```
$ quarto --help

Usage:   quarto
Version: 1.5.53

Description:

  Quarto CLI

Options:

  -h, --help     - Show this help.
  -V, --version  - Show the version number for this program.

Commands:
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Commands:

  render      [input] [args...]     - Render files or projects to various document types.
  preview     [file] [args...]      - Render and preview a document or website project.
  serve       [input]               - Serve a Shiny interactive document.

  create      [type] [commands...]  - Create a Quarto project or extension

  use         <type> [target]       - Automate document or project setup tasks.
  add         <extension>           - Add an extension to this folder or project
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  use        <type> [target]       - Automate document or project setup tasks.
  add        <extension>           - Add an extension to this folder or project
  update     [target...]           - Updates an extension or global dependency.
  remove     [target...]           - Removes an extension.

  convert    <input>               - Convert documents to alternate representations.
  pandoc     [args...]             - Run the version of Pandoc embedded within Quarto.
  typst      [args...]             - Run the version of Typst embedded within Quarto.
  run        [script] [args...]    - Run a TypeScript, R, Python, or Lua script.
```

How to use Quarto?

Quarto integrates with other tools.

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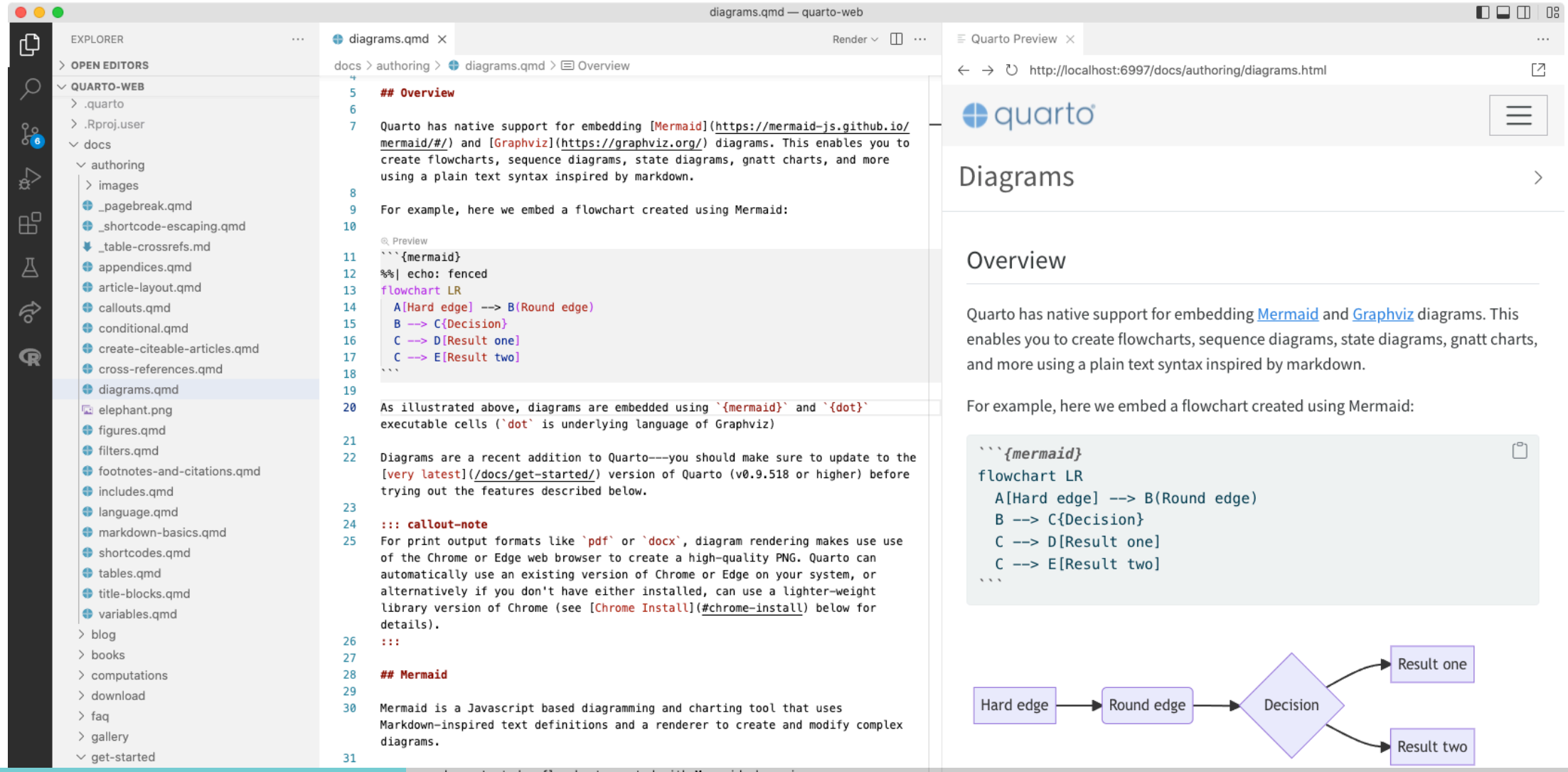

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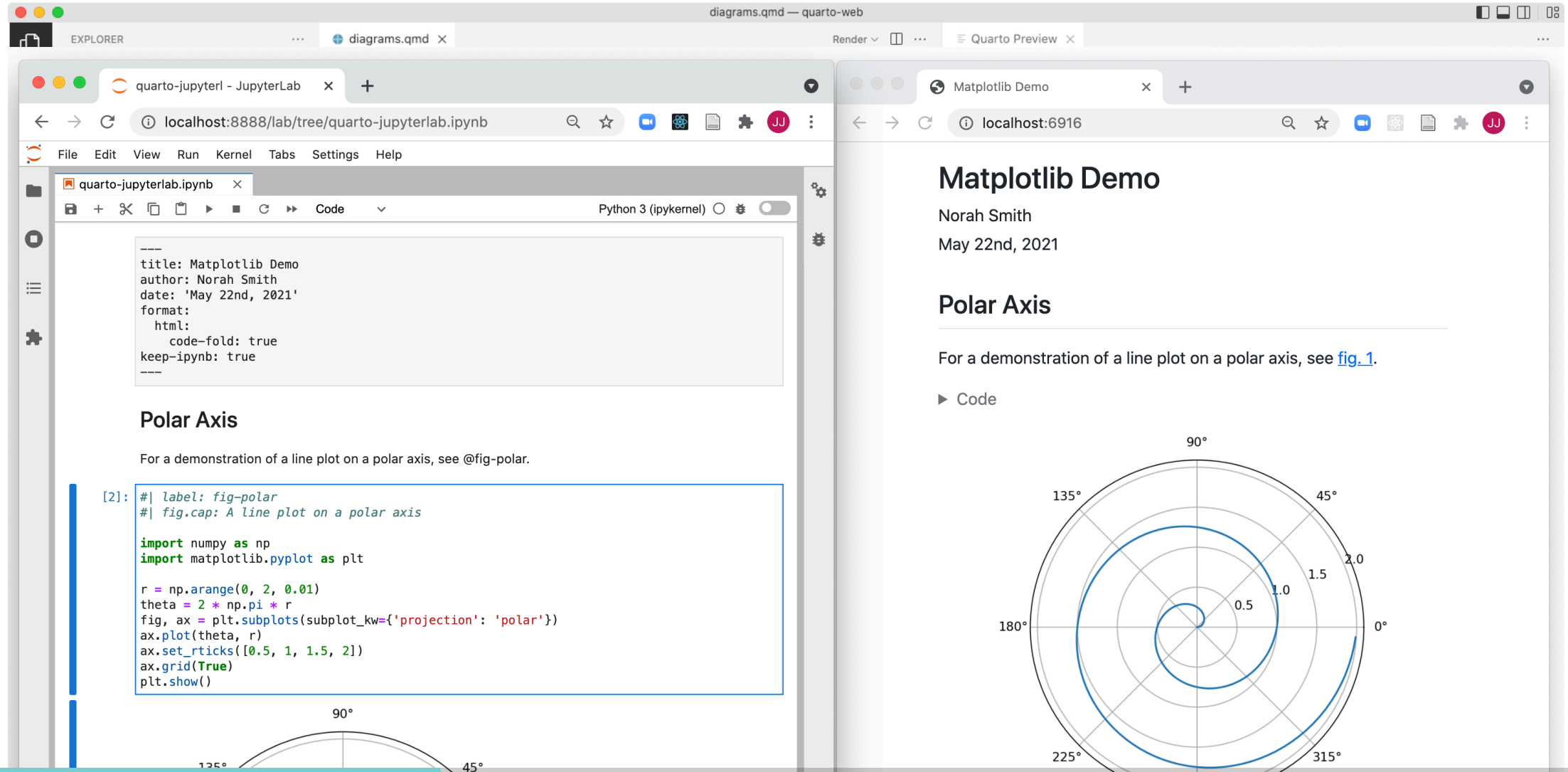

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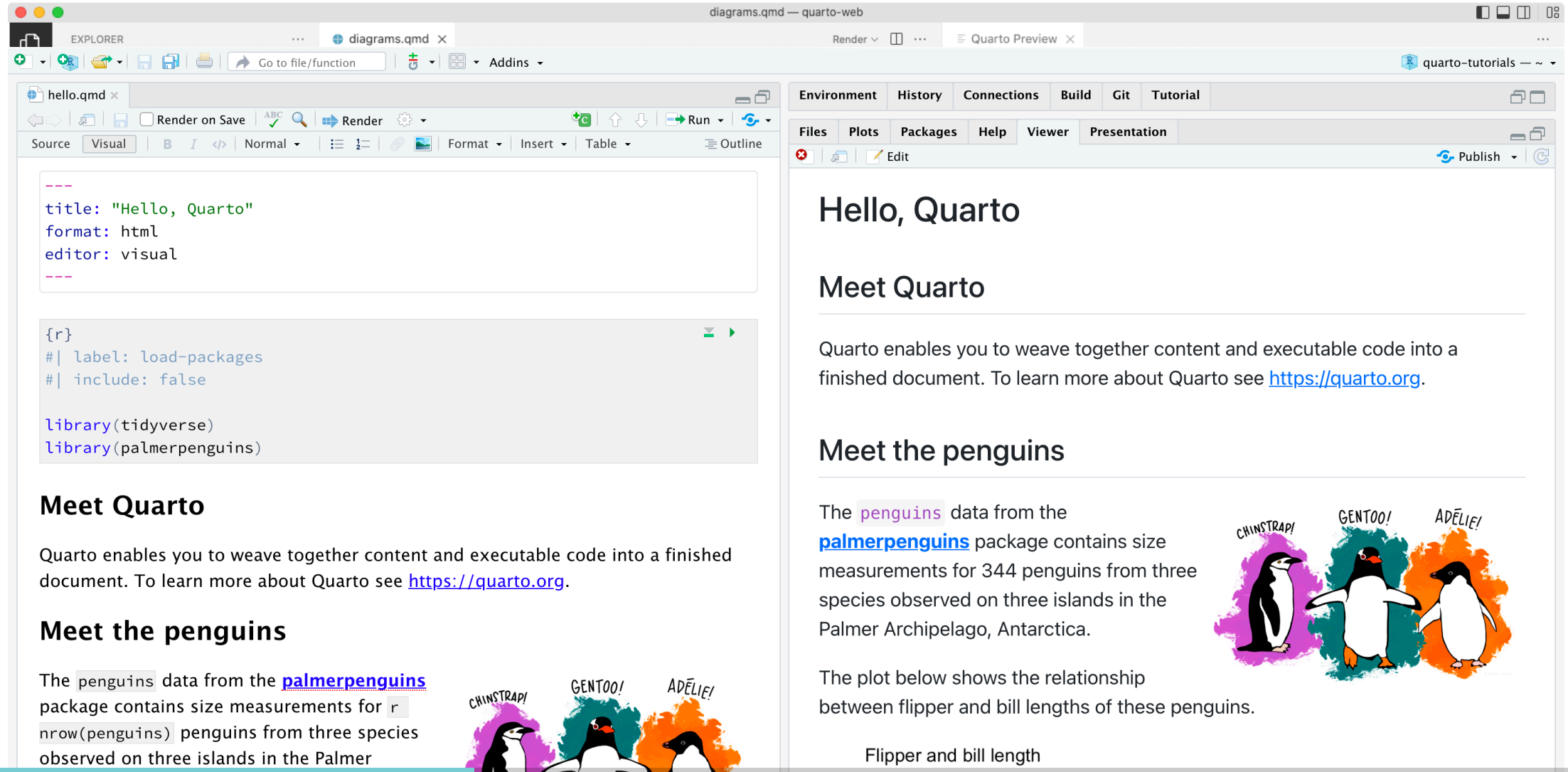

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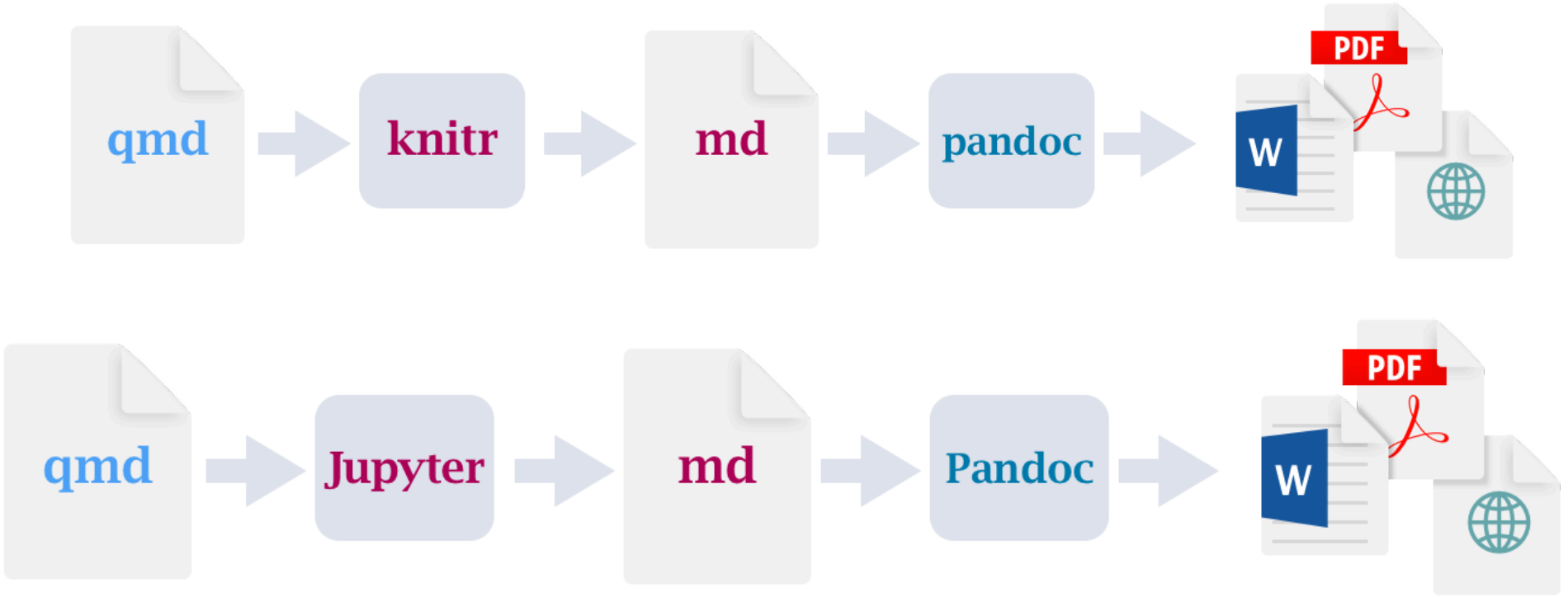

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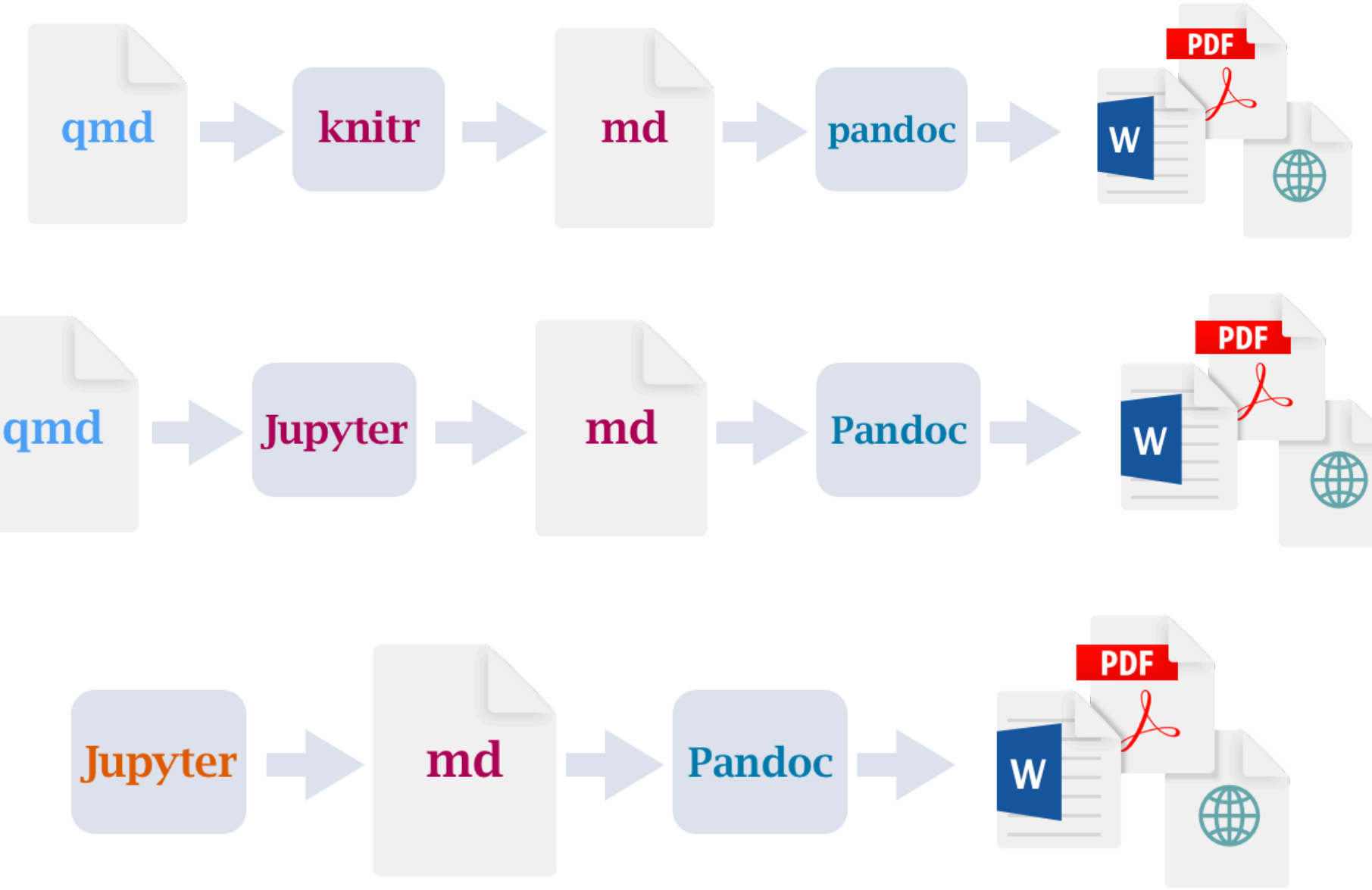

Quarto Syntax

From R Markdown...

````
---
title: Hello penguins!
output:
  html_document:
    toc: true
---

Some **Markdown** content based on _Pandoc_'s markdown

```{r species, fig.width=5, fig.cap="About penguins"}
ggplot(penguins) + aes(x = bill_length_mm, y = bill_depth_mm, color = species) +
  geom_point() + labs(x = "Bill length (mm)", y = "Bill depth (mm)")
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Quarto formats

Multiple fresh polished formats, built-in, with consistent syntax and features.

Feature	Quarto	R Markdown
Basic Formats	html	html_document
	pdf	pdf_document
	docx	word_document
	typst	
Beamer	beamer	beamer_presentation
PowerPoint	pptx	powerpoint_presentation
HTML Slides	revealjs	xaringan
		ioslides
		revealjs

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Multiple fresh polished formats, built-in, with consistent syntax and features.

Feature	Quarto	R Markdown
Cross References	Quarto Crossrefs	html_document2
		pdf_document2
		word_document2
Advanced Layout	Quarto Article Layout	tufte
		distill
Websites & Blogs	Quarto Websites	blogdown
	Quarto Blogs	distill
Books	Quarto Books	bookdown
Interactivity	Quarto Interactive Documents	Shiny Documents
Dashboards	Quarto Dashboards	flexdashboard

Focus: HTML Theming

Quarto theme files are based on SCSS for all HTML output formats (shared by HTML and RevealJS slides, extendable to work with anything).

For boostrap document, based on core variables defined by bslib (so fully compatible with Shiny, Flexdashboard, & R Markdown themes).

my-style.scss (Quarto theme file)

```scss
/*-- scss:defaults --*/
$h2-font-size:           1.6rem !default;
$headings-font-weight:   500 !default;

$custom-color: blue;

/*-- scss:rules --*/
h1, h2, h3, h4, h5, h6 {
  text-shadow: -1px -1px 0 rgba(0, 0, 0, .3);
  color: $custom-color;
}
```

_quarto.yml or YAML header

```yaml
format:
  html:
    linkcolor: darkgrey
    theme: [litera, my-style.scss]
```

Focus: Typst CSS for nice table output in PDF

New PDF rendering through Typst (https://typst.app)

```
format: typst
```

This is the quickest way to do PDF with already nice features !

```
# Producing a HTML Table with CSS styles
library(gt)

temps <- data.frame(
  year = c(1920:1924),
  Jan = c(40.6, 44.2, 37.5, 41.8, 39.3),
  Jun = c(58.5, 58.7, 57.8, 52.7, 57.7)
)

nice_col <- scales::col_numeric(
  colorspace::diverge_hcl(
    n = 9, palette = "Green-Orange"
  ), domain = c(35, 62)
)

gt(temps) |>
  data_color(
  columns = c(-year),
  fn = nice_col
)
```

year	Jan	Jun
1920	40.6	58.5
1921	44.2	58.7
1922	37.5	57.8
1923	41.8	52.7
1924	39.3	57.7

Rendered in PDF with Typst

Focus: Publishing

Integrated `quarto publish` command that targets a variety of services

```
> quarto publish --help

Usage:   quarto publish [provider] [path]
Version: 1.5.52

Description:

  Publish a document or project to a provider.

  Available providers include:

   - Quarto Pub (quarto-pub)
   - GitHub Pages (gh-pages)
   - Posit Connect (connect)
   - Posit Cloud (posit-cloud)
   - Netlify (netlify)
   - Confluence (confluence)
   - Hugging Face Spaces (huggingface)

  Accounts are configured interactively during publishing.
  Manage/remove accounts with: quarto publish accounts
```

Focus: Shortcodes

Quarto specific syntax to include content:

https://quarto.org/docs/authoring/shortcodes.html

```
Let's add some sample image !

![A caption]({{< placeholder >}})
```

`placeholder` is one of the built-in shortcodes

Let's add some sample image !

A caption

Shortcodes is among what is extensible using Quarto Extensions

Quarto Projects

> A Quarto Project is a directory that contains a file called _quarto.yml.

Organizing content as a project to gain project's features and enhanced outputs

```
# from project root
quarto render
```

- Projects have a type (website, book, manuscript, ...) driving behaviors and specific features
- Shared metadata from project to sub-folder level
- Reproducibility with computations can be controlled (cache, freeze)
- Pre and Post render scripts can be added
- Project Profile for distinct project behavior

Quarto Projects

Examples of project's configurations

_quarto.yml (simple website)

```yaml
project:
  type: website

website:
  title: "today"
  favicon: logo.png
  navbar:
    left:
      - href: index.qmd
        text: Home
      - about.qmd

format:
  html:
    theme: cosmo
    css: styles.css
    toc: true

freeze: auto
```

_quarto.yml (simple book)

```yaml
project:
  type: book

book:
  title: "mybook"
  author: "Jane Doe"
  date: "8/18/2021"
  chapters:
    - index.qmd
    - intro.qmd
    - references.qmd

bibliography: references.bib

format:
  html: default
  pdf: default
  epub:
    cover-image: cover.png
```

Learning More

> This presentation aimed to give you a taste of what Quarto can do and a broad overview of its features.
>
> Follow other talks at useR! 2024 to learn more about Quarto, and our resources below.

Resources

- Getting started: https://quarto.org/docs/get-started/
- User guide: https://quarto.org/docs/guide/
- Awesome Quarto: https://github.com/mcanouil/awesome-quarto

Questions?