



# Introduction to Quarto

# Funding Disclosure

- This work is supported by the United States Centers for Disease Control and Prevention funding under the Global Health Security Partnerships: Expanding and Improving Public Health Laboratory Strategies and Systems (Grant Number: NU2HGH000080).

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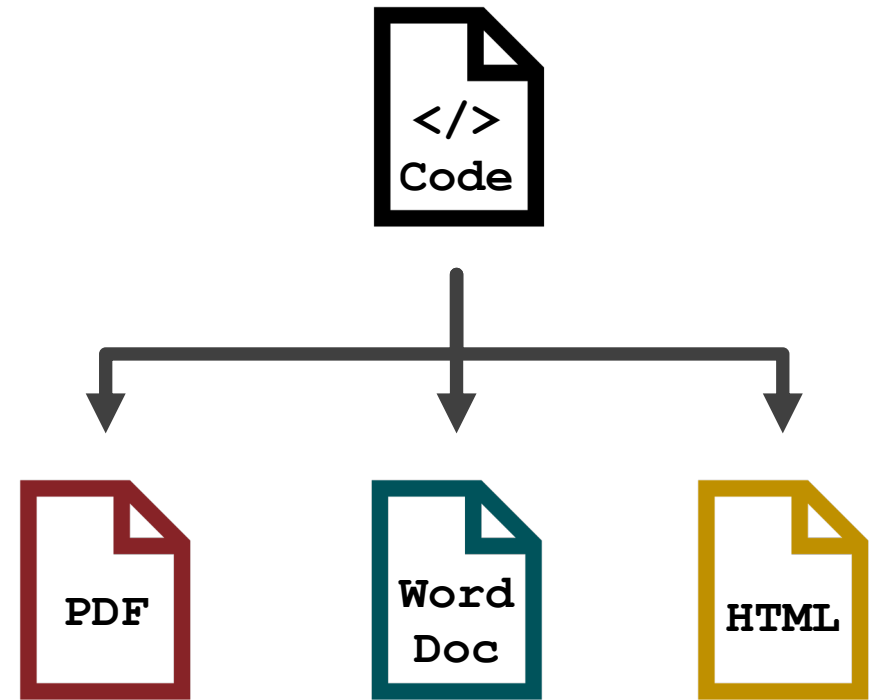
Example Reports

# Quarto Overview

Quarto is an **open-source**, scientific and technical **publishing system**.

Create publications / reports with code!

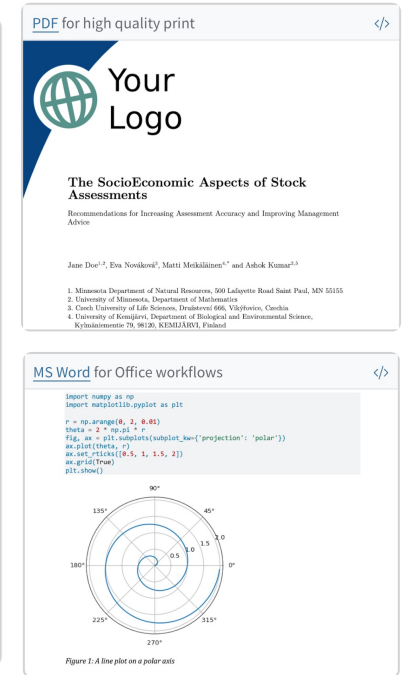
Can be **automated!**



# Quarto Overview

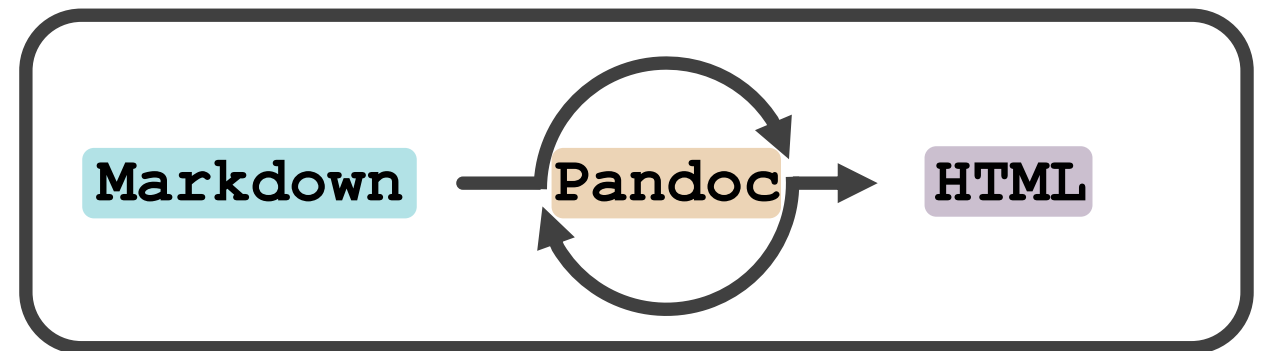
Many types of media can be produced:

- Documents (**articles / reports**)
- Presentations
- Websites



<https://quarto.org/docs/gallery/>

Markdown and "shortcodes"  
converted to HTML via Pandoc.

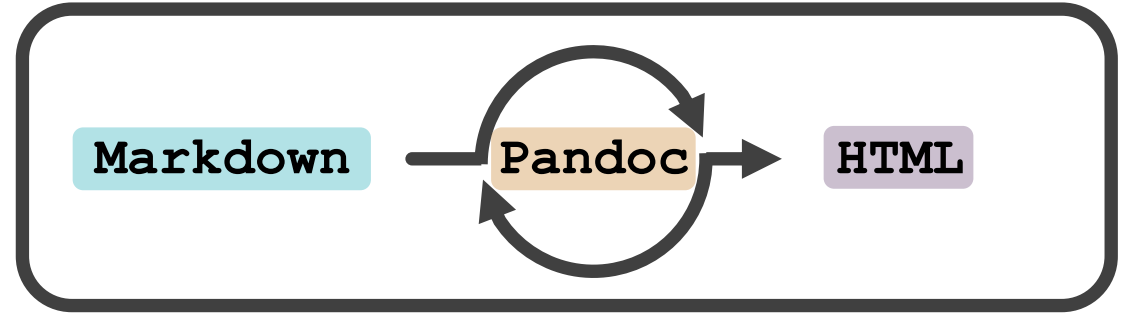




# Markdown Basics

# Markdown Basics

Markdown - format media (text, images, etc.,) using plain text.



Example:

## Markdown

```
# This is a header
## This is a subheader

![This is an
image](image.jpg)
```



## HTML

```
<h1>This is a header</h1>
<h2>This is a subheader</h2>


```

# Plain HTML

Plain HTML can be used in place of markdown

## Markdown & HTML

```
## These are the same
```

```
<h2>These are the same</h2>
```



## HTML (Rendered)

**These are the same**

**These are the same**

# Markdown: Headers, Simple Text, & Lists

## Markdown

```
# Influenza
## A / B
### Subtypes / Lineages

Flu A and B use different
classification schemes:
- Flu A uses subtypes
(e.g., H5N1)
- Flu B uses lineages
(.e.g., Yamagata).
```



## HTML (Rendered)

### Influenza

#### A / B

#### Subtypes / Lineages

Flu A and B use different classification schemes:

- **Flu A** uses *subtypes* (e.g., H5N1)
- **Flu B** uses *lineages* (.e.g., Yamagata).

# Markdown: Tables & Figures

## Markdown

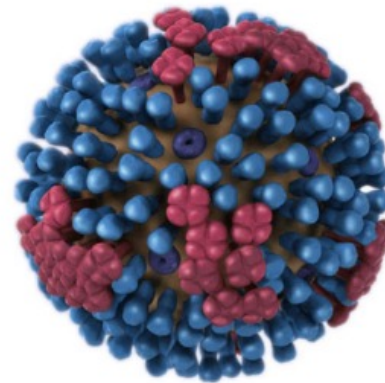
```
| Species | Subtype |  
|-----|-----|  
| Influenza A | H1N1 |  
| Influenza A | H3N2 |  
| Influenza B | Yamagata |  
| Influenza B | Victoria |
```

```
![] (https://www.cdc.gov/bird-  
flu/media/images/2024/05/flu-  
virus.jpg)
```



## HTML (Rendered)

Species	Subtype
Influenza A	H1N1
Influenza A	H3N2
Influenza B	Yamagata
Influenza B	Victoria



# Markdown: Block quotes & Callouts

## Markdown

```
#### Block Quote  
> Influenza B Yamagata may be  
*extinct*!
```

```
#### Callout  
::: {.callout-note}  
Influenza B Yamagata may be  
*extinct*!  
:::
```



## HTML (Rendered)

### Block Quote

Influenza B Yamagata may be *extinct*!

### Callout

 Note

Influenza B Yamagata may be *extinct*!

# Markdown: Code Blocks

## Markdown

```
#### Without brackets
```

```
```python
```

```
print("Bioinformaticians rule,  
epis drool!")  
```
```

```
#### With Brackets
```

```
```{python} ← Called a "chunk"
```

```
print("Bioinformaticians rule,  
epis drool!")  
```
```

## HTML (Rendered)

Without brackets [↗](#)

```
print("Bioinformaticians rule, epis drool!")
```

With Brackets

```
print("Bioinformaticians rule, epis drool!")
```

Bioinformaticians rule, epis drool!

Code is executed and the result is rendered!



# Code Chunks & Automation

# Code “Chunk” Settings

## Markdown

```
```{python}
#| echo: false
#| output: true

print("Bioinformaticians rule,
epis drool!")
```
```

Execution settings



## HTML (Rendered)

```
Bioinformaticians rule, epis drool!
```

Only the result is returned -  
**no code!**

| Option  | Behavior              |
|---------|-----------------------|
| eval    | run code              |
| echo    | show code             |
| output  | show code result      |
| include | run code but hide all |

| Option  | Behavior               |
|---------|------------------------|
| warning | show code warnings     |
| message | show code messages     |
| error   | show code errors       |
| cache   | cache execution result |



# Using Multiple Code Languages

Multiple coding languages can be used in a single document including Python, R, Bash, and SQL.

Python is executed via R using the `reticulate` package when included in the same document.

Requires configuration. Turn off with  
`{python, python.reticulate = FALSE}`

```
`` `{r}`  
df <- readr::read_csv("results.csv")  
```
```


```
`` `{python}`  
df.head()  
```
```

Objects are shared between languages  
(requires `reticulate`)

# Quarto Front Matter

Global document configurations and metadata are defined at the start of the document in the **front matter**.


- **Metadata:** title, author, date, etc.
- **Global Config:** format, execute, etc.

```
---  YAML  
title: "Influenza Report"  
author:  
  - name: Jane Doe  
date: today  
format:  
  html:  
    embed-resources: true  
execute:  
  echo: false  
---  
  
# Overview  
This report includes ...
```

# Quarto Front Matter

Global document configurations and metadata are defined at the start of the document in the **front matter**.


- **Metadata:** title, author, date, etc.
- **Global Config:** format, execute, etc.
- **Params:** custom fields

```
---  YAML
title: "Influenza Report"
author:
  - name: Jane Doe
date: today
format:
  html:
    embed-resources: true
execute:
  echo: false
params:
  species: Influenza A
  subtype: H1N1
---

# Overview

This report is about {{< meta params.species >}}
{{< meta params.subtype >}} ...
```

Use short code to  
reference front matter  
metadata in the document





# Report Development & Rendering

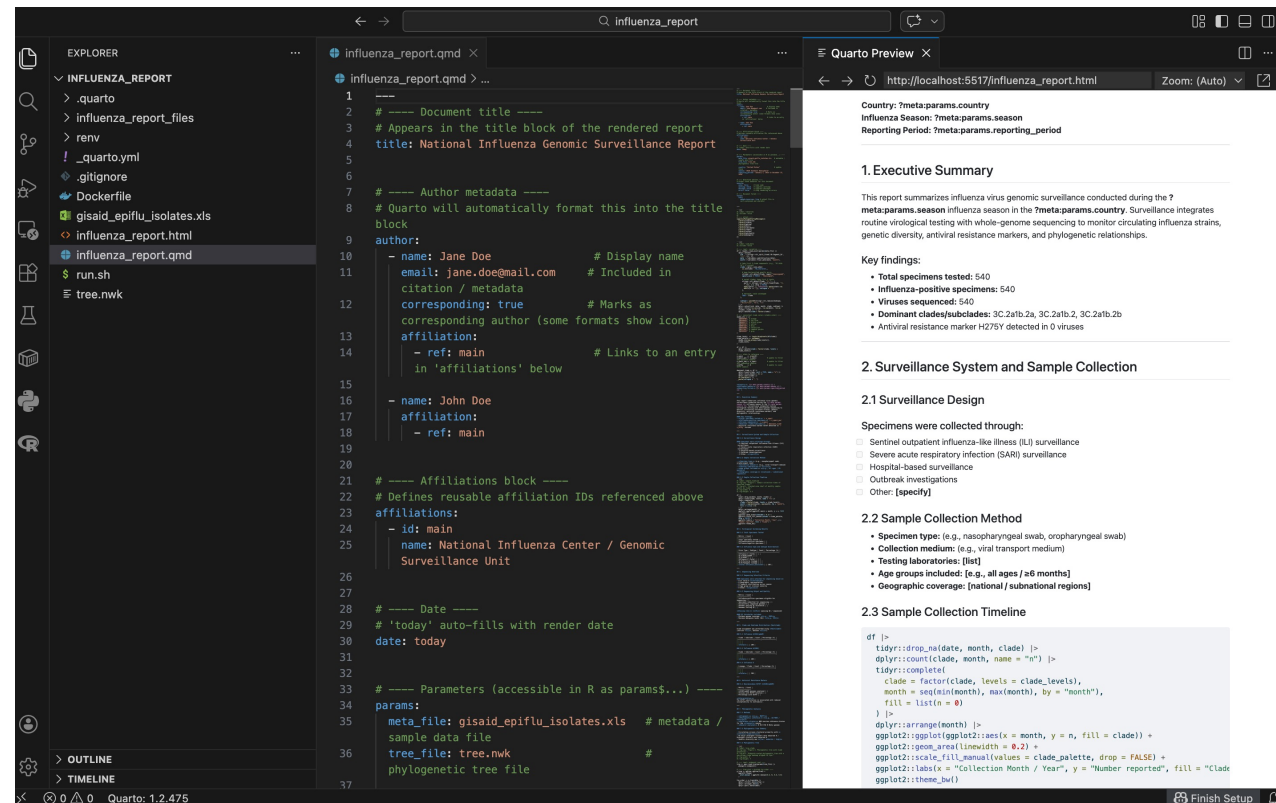
# Interactive Development Environments (IDEs)

IDEs are ideal for report development or for reports that require manual edits (non-automated).

## Example: Visual Studio Code

Many options:

- Rstudio
- Positron
- Visual Studio Code



# Basic Command-Line Use

Rendering via command-line is ideal for automation.

## Shell

```
> quarto render \  
  -o $(date +"%Y-%m-%d")_report.html \  
  --execute-params params.yml \  
  report.qmd
```

Add timestamp to output file

Supply document parameters via a YAML file (e.g., **input\_file**: "2026\_results.csv")

## Quarto

```
---  
params:  
  input_file: "results.csv"  
---  
```{r}  
df <- read_csv(params["input_file"])  
```
```

Replaced by value supplied in YAML

Reference params in code!

# Sharing Quarto reports

## Embedding resources

Quarto

---

format:

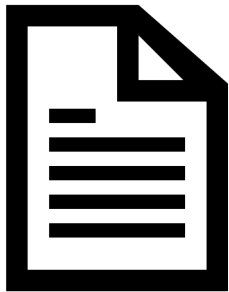
html:

`embed-resources: true`

---

Images, themes, etc., are embedded, allowing you to share a **single** file

## Sharing files



genome\_report.html

Share the HTML file, **not** the local URL

`http://localhost:7779/genome_report.html`





# Report Template



**APHL Global  
Health webpage**



# Questions?

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