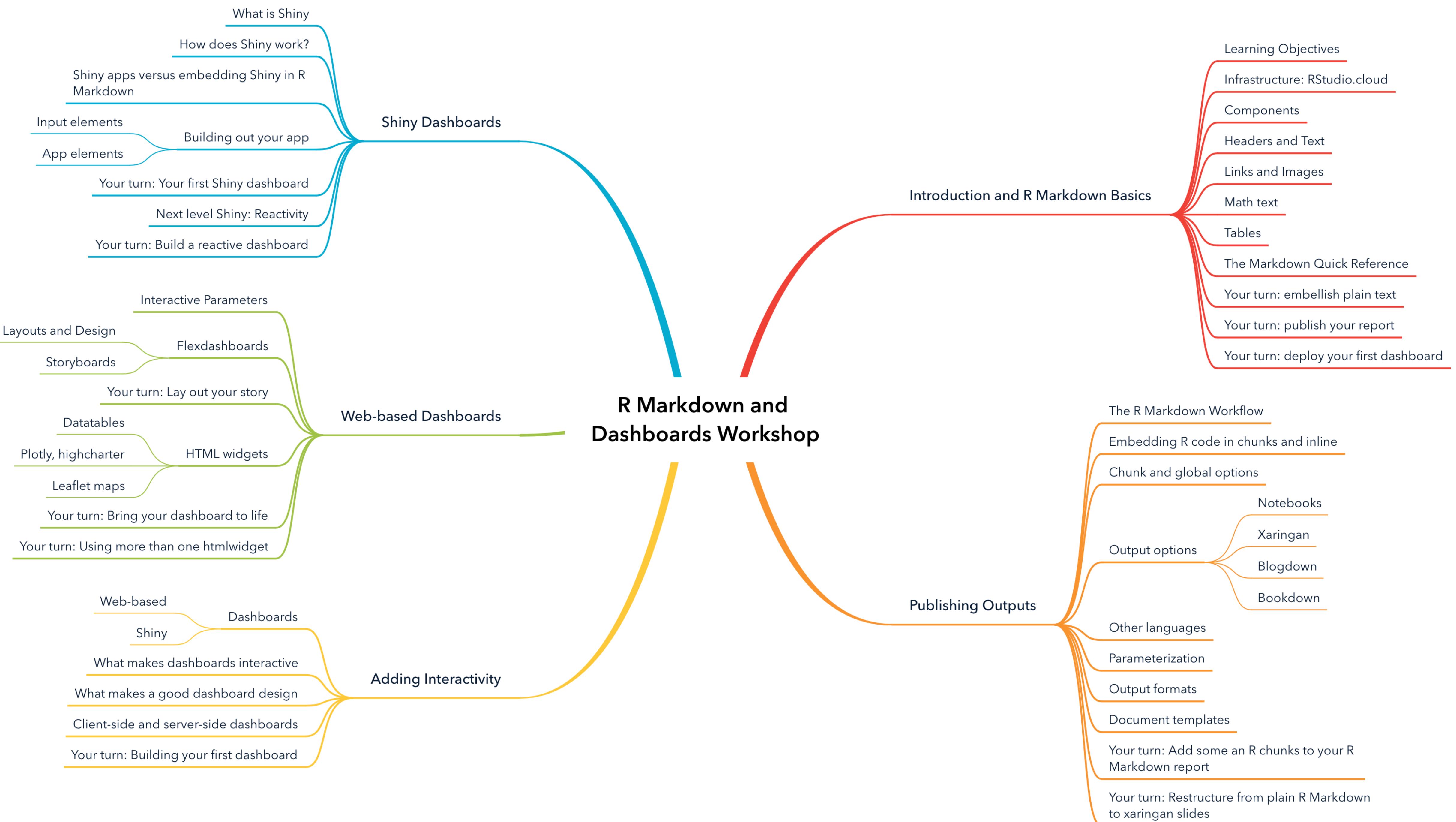




RStudio Education  
[education.rstudio.com](http://education.rstudio.com)

# R Markdown and Interactive Dashboards Publishing Outputs

# R Markdown and Dashboards Workshop



## Publishing Outputs

### The R Markdown Workflow

Embedding R code in chunks and inline

Chunk and global options

Notebooks

Output options

Xaringan

Blogdown

Bookdown

Other languages

Parameterization

Output formats

Document templates

Your turn: Add some an R chunks to your R  
Markdown report

Your turn: Restructure from plain R Markdown  
to xaringan slides

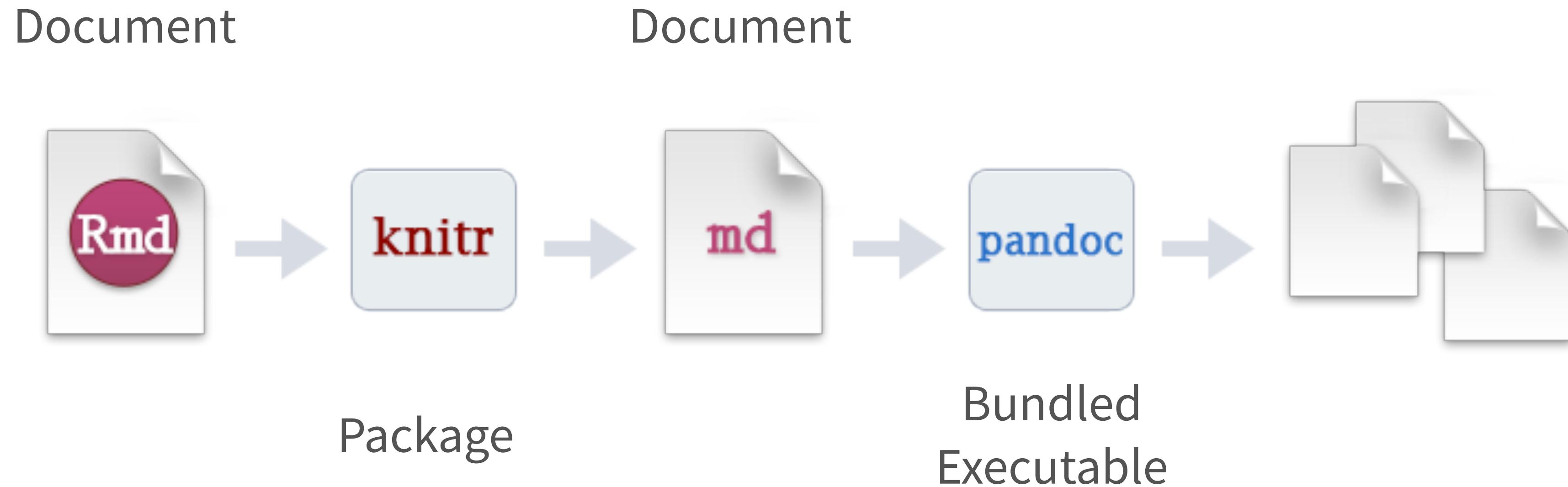
# REVIEW QUIZ

- R Markdown is a language for creating \_\_\_\_\_ documents.
- Metadata for an R Markdown document is written at the top of the document in \_\_\_\_\_
- Name one or more types of information that we learned how to include in an R Markdown document.

*R Markdown is a system for  
creating structured  
computational documents*

**STAGE DOOR  
BAND AND CREW  
ONLY**

# R MARKDOWN RELIES ON A TOOLCHAIN



*R Markdown can knit to many  
document types*



# WE'VE MOSTLY FOCUSED ON HTML OUTPUT

Document



**knitr**

Document



**pandoc**



Reports



Slides



Dashboards



Web Sites

Package

Bundled Executable



And many many more....

[rstd.io/RMAID](http://rstd.io/RMAID)



# EXERCISE 21

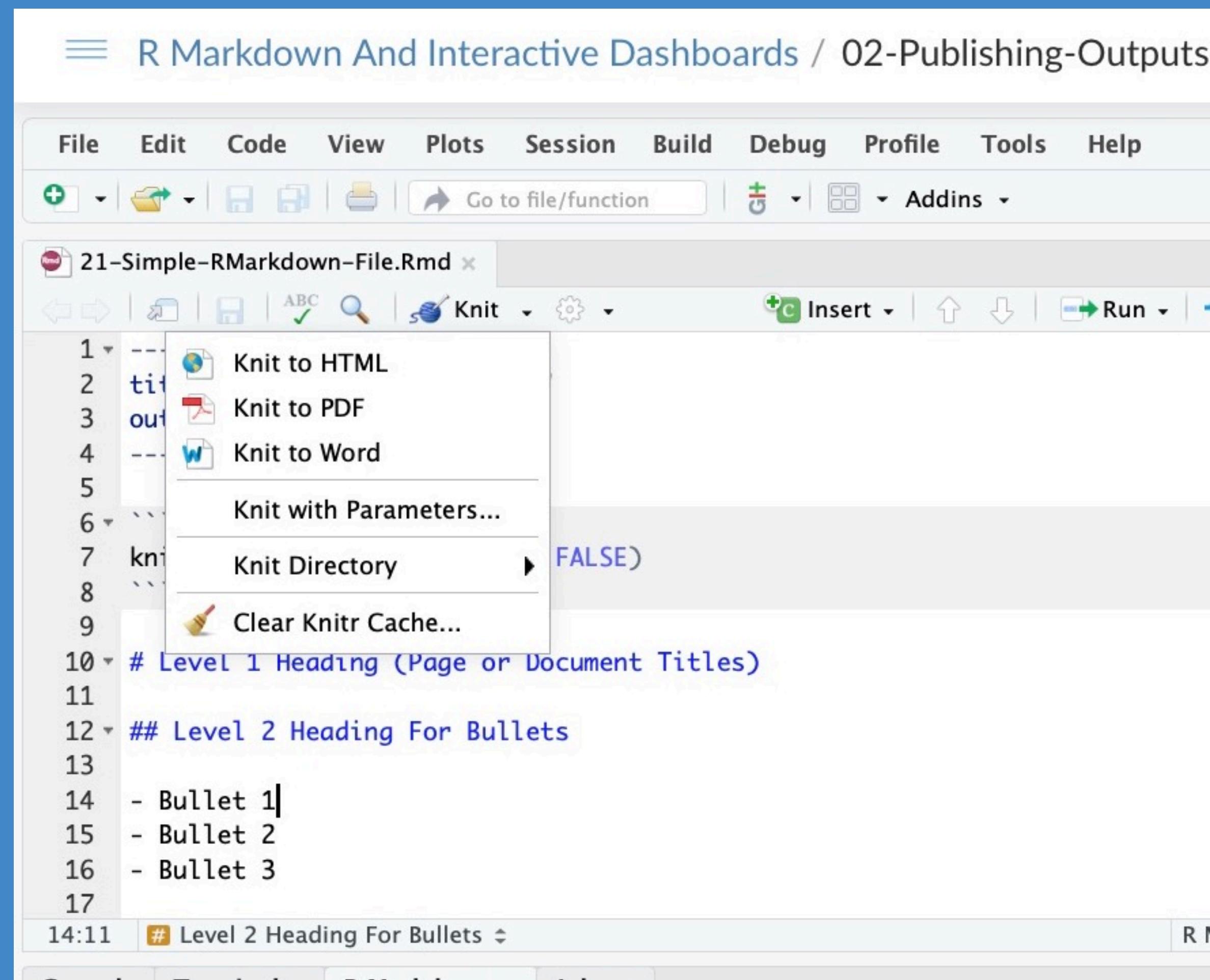
(Don't be concerned that you missed a bunch of exercises. Each module has its own unique exercise numbers, but exercise numbers aren't consecutive between modules)

## Knit to Different Formats

1. Open project **02-Publishing-Outputs**
2. Click on **21-Simple-RMarkdown-File.Rmd** in the Files pane to open that file
3. Click on the arrow next to Knit, and select **Knit to HTML**
4. Now click on the arrow next to Knit and select **Knit to PDF**, and **Knit to Word** to view different outputs

WARNING: you may need to disable your browser pop-up blocker to see the result

3m 00s



## YAML\* Header Data About Your Document (Metadata)

\*YAML: Yet Another Markdown Language

- Different values in the document type will create different outputs
- Various Document output types may require you to add more parameters and sub-parameters in the YAML header

```
---
```

```
title: "My First R Markdown Document"
author: "Carl Howe, RStudio"
date: "8/26/2019"
output: html_document
---
```

# INCOMPLETE DOCUMENT TYPE MAP

YAML Output String	Additional Packages Required	Output Type	Output Document Extension
html_document	None	Report	HTML
pdf_document	None	Report	PDF
word_document	None	Report	.DOCX File
ioslides_presentation	None	Presentation	HTML
xaringan::moon_reader	xaringan	Presentation	HTML
powerpoint_presentation	None	Presentation	.PPTX File
flex_dashboard	flexdashboard	Dashboard	HTML

And there are many more: <https://rmarkdown.rstudio.com/lesson-9.html>

# SELECT YOUR OUTPUT FILE TYPE USING YAML STATEMENTS

```
---
```

```
title: "Simple Markdown File"
output: html_document
```

```
---
```

```
---
```

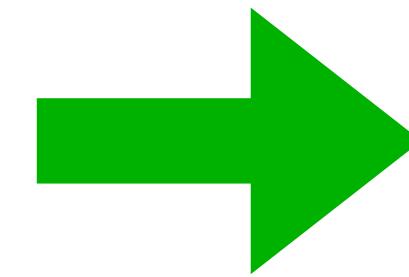
```
title: "Simple Markdown File"
output: pdf_document
```

```
---
```

```
---
```

```
title: "Simple Markdown File"
output: word_document
```

```
---
```



Simple Markdown File

Level 1 Heading (Page or Document Titles)

Level 2 Heading For Bullets

- Bullet 1
- Bullet 2
- Bullet 3

Level 2 Table Output

Here's a Level 2 table

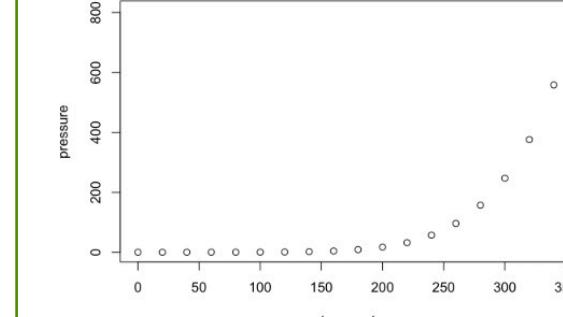
summary(cars)
## speed dist
## Min. : 4.0 Min. : 2.00
## 1st Qu.:12.0 1st Qu.: 26.00
## Median :15.0 Median : 36.00
## Mean :15.4 Mean : 42.98
## 3rd Qu.:19.0 3rd Qu.: 56.00
## Max. :25.0 Max. :120.00

Level 2: An Equation

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

A Level 2 Plot

Here's a Level 2 plot



A scatter plot showing pressure (y-axis, 0 to 800) versus temperature (x-axis, 0 to 350). The data points show a positive correlation, with most points clustered between 0 and 250 on both axes, and a few outliers at higher temperatures (around 300-320) and pressures (around 400-600).

Simple Markdown File

Level 1 Heading (Page or Document Titles)

Level 2 Heading For Bullets

- Bullet 1
- Bullet 2
- Bullet 3

Level 2 Table Output

Here's a Level 2 table

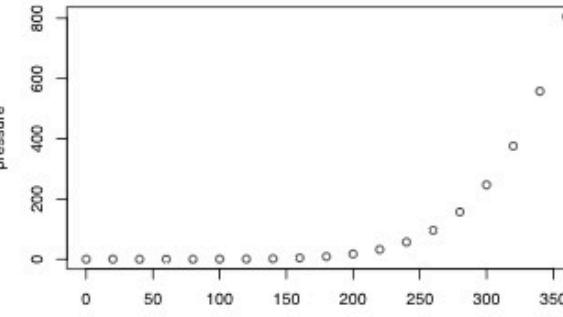
summary(cars)
## speed dist
## Min. : 4.0 Min. : 2.00
## 1st Qu.:12.0 1st Qu.: 26.00
## Median :15.0 Median : 36.00
## Mean :15.4 Mean : 42.98
## 3rd Qu.:19.0 3rd Qu.: 56.00
## Max. :25.0 Max. :120.00

Level 2: An Equation

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

A Level 2 Plot

Here's a Level 2 plot



A scatter plot showing pressure (y-axis, 0 to 800) versus temperature (x-axis, 0 to 350). The data points show a positive correlation, with most points clustered between 0 and 250 on both axes, and a few outliers at higher temperatures (around 300-320) and pressures (around 400-600).

Simple Markdown File

Level 1 Heading (Page or Document Titles)

Level 2 Heading For Bullets

- Bullet 1
- Bullet 2
- Bullet 3

Level 2 Table Output

Here's a Level 2 table

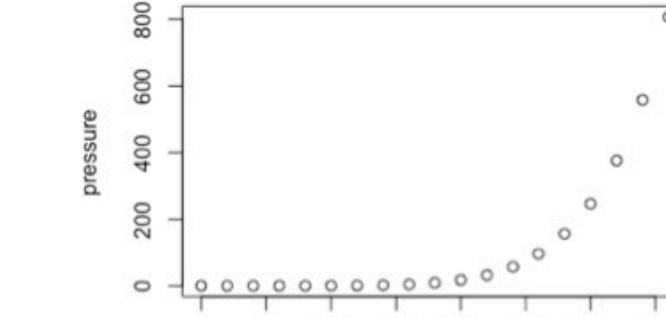
summary(cars)
## speed dist
## Min. : 4.0 Min. : 2.00
## 1st Qu.:12.0 1st Qu.: 26.00
## Median :15.0 Median : 36.00
## Mean :15.4 Mean : 42.98
## 3rd Qu.:19.0 3rd Qu.: 56.00
## Max. :25.0 Max. :120.00

Level 2: An Equation

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

A Level 2 Plot

Here's a Level 2 plot



A scatter plot showing pressure (y-axis, 0 to 800) versus temperature (x-axis, 0 to 350). The data points show a positive correlation, with most points clustered between 0 and 250 on both axes, and a few outliers at higher temperatures (around 300-320) and pressures (around 400-600).

# SELECT YOUR OUTPUT FORMAT USING YAML STATEMENTS

```
---
```

```
title: "Simple Markdown File"
output: html_document
```

```
---
```

```
---
```

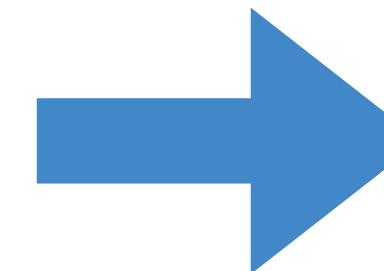
```
title: "Simple Markdown File"
output:
  html_document:
    theme: cosmo
```

```
---
```

```
---
```

```
title: "Simple Markdown File"
output:
  html_document:
    theme: cerulean
```

```
---
```



Simple Markdown File

Level 1 Heading (Page or Document Titles)

Level 2 Heading For Bullets

- Bullet 1
- Bullet 2
- Bullet 3

Level 2 Table Output

Here's a Level 2 table

```
summary(cars)
```

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

Level 2: An Equation

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

A Level 2 Plot

Here's a Level 2 plot



Simple Markdown File

Level 1 Heading (Page or Document Titles)

Level 2 Heading For Bullets

- Bullet 1
- Bullet 2
- Bullet 3

Level 2 Table Output

Here's a Level 2 table

```
summary(cars)
```

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

Level 2: An Equation

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

A Level 2 Plot

Here's a Level 2 plot

Level 3 Heading (Subheads or Tab Titles)

This just illustrates how level 3 subsections are rendered

Simple Markdown File

Level 1 Heading (Page or Document Titles)

Level 2 Heading For Bullets

- Bullet 1
- Bullet 2
- Bullet 3

Level 2 Table Output

Here's a Level 2 table

```
summary(cars)
```

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

Level 2: An Equation

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

A Level 2 Plot

Here's a Level 2 plot

Level 3 Heading (Subheads or Tab Titles)

This just illustrates how level 3 subsections are rendered

# SOME HTML\_DOCUMENT THEMES

## Default `html_document` themes

- default
- cerulean
- journal
- flatly
- darkly
- readable
- spacelab
- united
- cosmo
- lumen
- paper
- sandstone
- simplex
- yeti

## Packages offering more document themes

`tufte::tufte_html`

`prettydoc::html_pretty`

# YAML PARAMETERS

We went from

```
---
```

```
title: "Simple Markdown File"
```

```
output: html_document
```

```
---
```

To

```
---
```

```
title: "Simple Markdown File"
```

```
output:
```

```
    html_document:
```

```
        theme: cerulean
```

```
---
```

Look what changed:

- We put `html_document` on its own line under `output` and indented it 2 spaces.
- We added a colon to the end of `html_document` when we added the `theme` parameter
- We indented `theme` another 2 spaces

# Your Turn

When we added themes, we went from

```
---
```

```
title: "Simple Markdown File"
```

```
output: html_document
```

```
---
```

To

```
---
```

```
title: "Simple Markdown File"
```

```
output:
```

```
  html_document:
```

```
    theme: cerulean
```

```
---
```

In your groups, discuss:

1. Why is `output: html_document` now split across two lines?
2. What you think the indentation indicates?
3. Why is there no colon at the end of `cerulean`?



# YAML INDENTATION DEFINES RELATIONSHIPS

```
---
```

```
title: "Simple Markdown File"
```

```
output:
```

```
    html_document:
```

```
        theme: cerulean
```

```
---
```

1. `title` and `output` are top level parameters.
2. `html_document`'s indentation under `output` indicates it is a parameter of `html_document`.
3. `theme`'s indentation under `html_document` indicates it is a sub-parameter of `html_document`

# USING PARAMETERS IN YAML

- We're now going to use `html_document` parameters to explore tables of contents
- We'll modify the following YAML code to see what happens

```
---
```

```
title: "Simple Markdown File"
output:
  html_document:
    theme: cerulean
    number_sections: true
    toc: true
    toc_depth: 3
    toc_float: false
---
```

## EXERCISE 22

## Create A Table of Contents

1. Click on **22-Simple-RMarkdown-File.Rmd** in the Files pane to open that file
2. Experiment with different values for the parameters for **html\_document**
3. Once you have a feel for how the table of contents works, replace

```
  toc_float: false
```

with

```
  toc_float:  
    collapse: true  
    smooth_scroll: true
```

4. Prepare to explain what those new sub-parameters do

---

```
title: "Simple Markdown File"  
output:  
  html_document:  
    theme: cerulean  
    number_sections: true  
    toc: true  
    toc_depth: 3  
    toc_float: false
```

---



# So WHAT DID THESE PARAMETERS Do?

---

```
title: "Simple Markdown File"
output:
  html_document:
    theme: cerulean
    number_sections: true
    toc: true
    toc_depth: 3
    toc_float:
      collapse: true
      smooth_scroll: true
```

---

## Create A Presentation

1. Click on **23-ioslides-presentation.Rmd** in the Files pane to open that file
2. Change the YAML header to look like the one to the right.
3. Knit and step through the result in your preview pane (or launch in your browser)

```
---
```

```
title: "ioslides Presentation"
```

```
output:
```

```
  ioslides_presentation:
```

```
    widescreen: true
```

```
---
```

# DOCUMENT TYPE DRIVES R MARKDOWN SYMBOL INTERPRETATIONS

R Markdown Symbol	Alternate Symbol	Document Meaning	Presentation Meaning
#	==	Header 1	New Section
##	----	Header 2	New Slide
###		Header 3	Slide Subhead

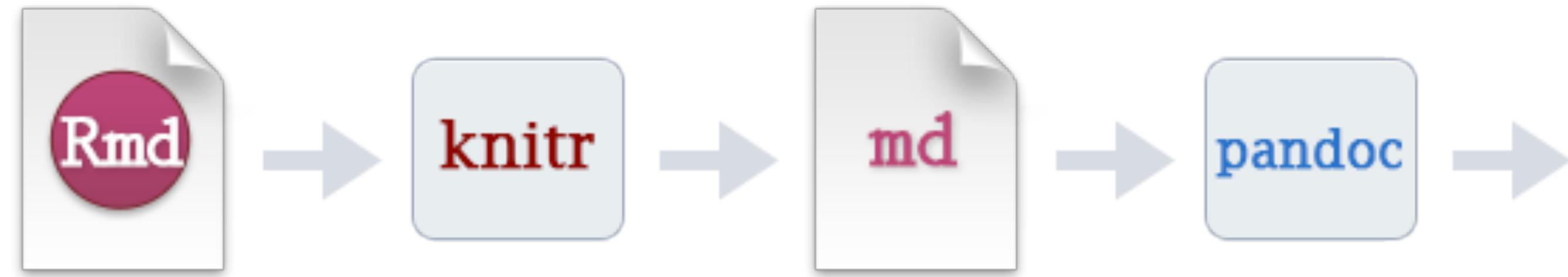
## Try A Different Presentation Framework

1. Click on **23-revealjs-presentation.Rmd** in the Files pane
2. Knit and step through the result in your preview pane (or launch in your browser)
3. What has changed from our prior HTML presentation?

3<sub>m</sub> 00<sub>s</sub>

# How COULD You USE THIS PRESENTATION WITHOUT RSTUDIO.CLOUD?

Output type  
revealjs\_presentation



Package

Document

Bundled  
Executable



23-revealjs-Presentation.html

[rstd.io/RMAID](http://rstd.io/RMAID)

*HTML-based R Markdown  
documents can be shared  
using the publish button in  
the RStudio IDE*

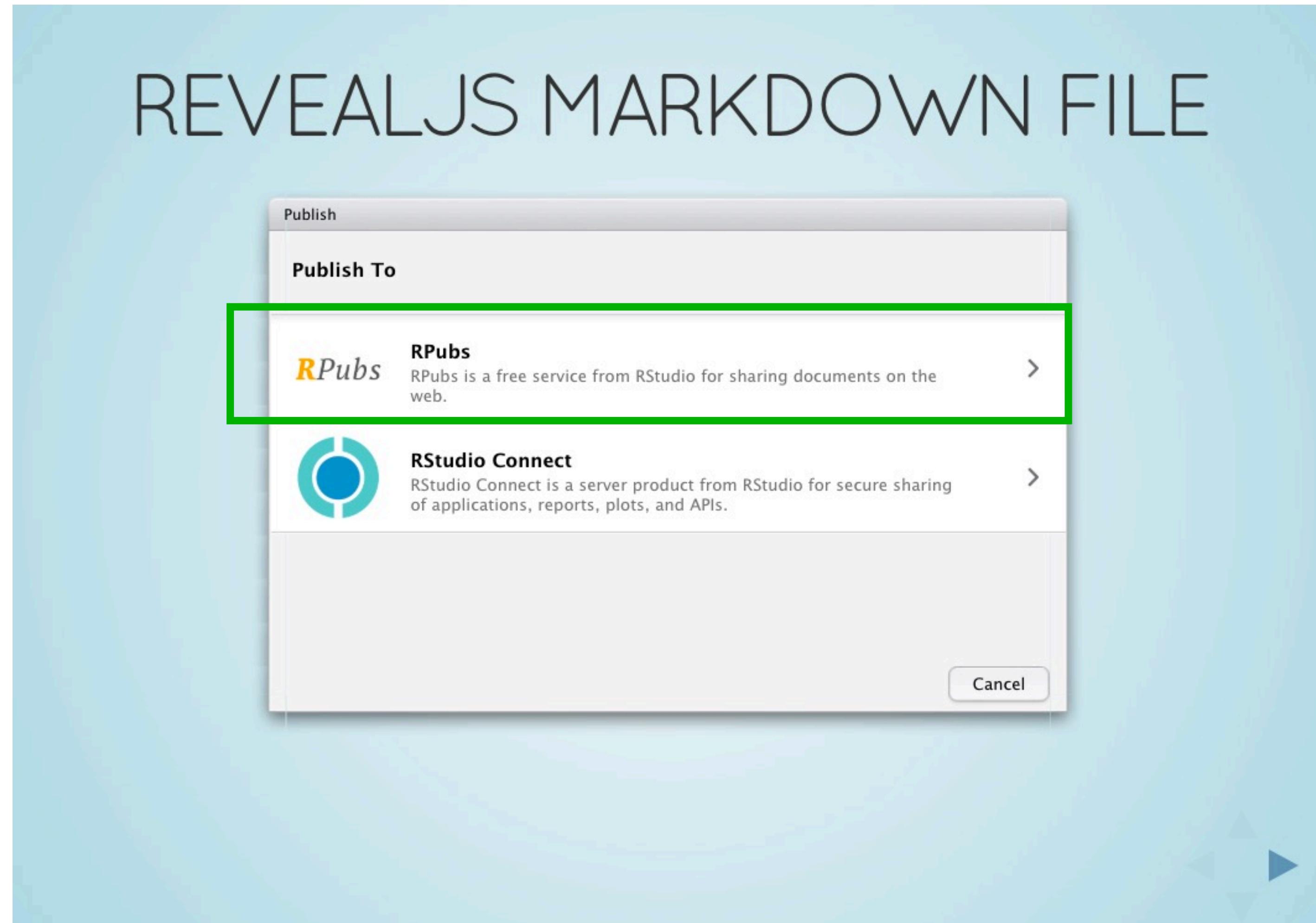
# LET'S PUBLISH OUR SLIDES TOGETHER

1. Knit 23-revealjs-presentation.Rmd and click the Publish button at the top.



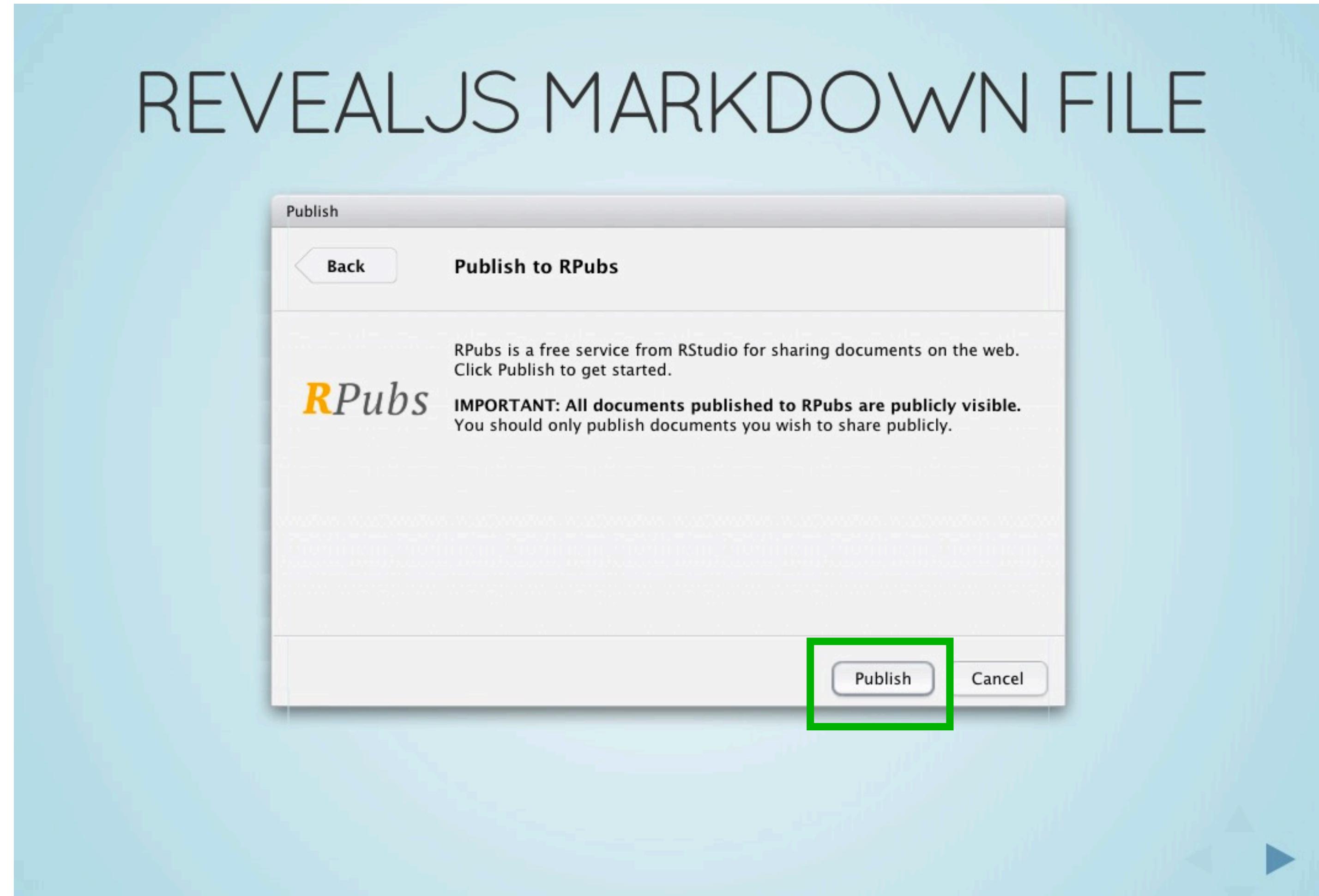
# LET'S PUBLISH OUR SLIDES TOGETHER

## 2. Click on RPubs



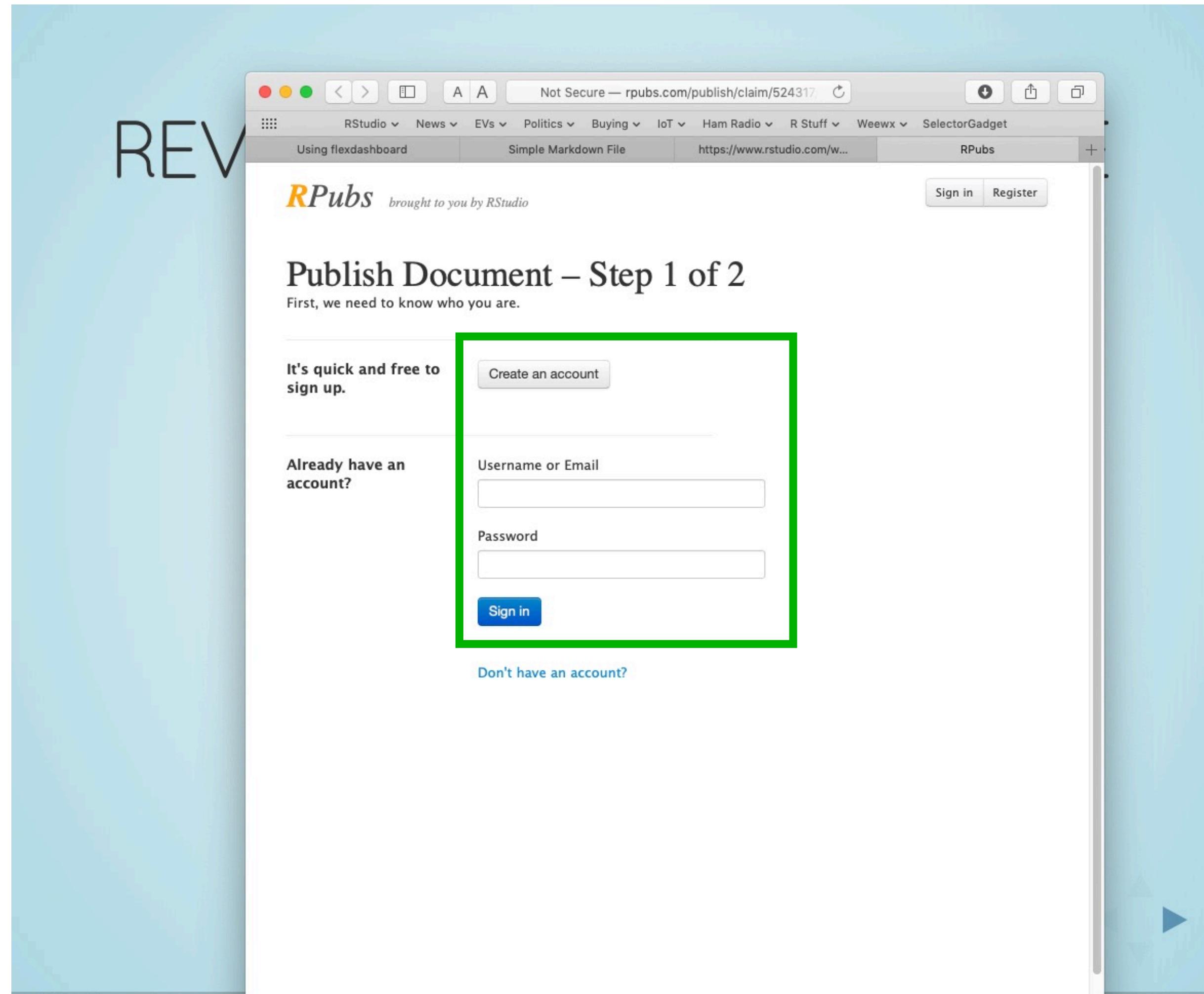
# LET'S PUBLISH OUR SLIDES TOGETHER

## 3. Click Publish



# LET'S PUBLISH OUR SLIDES TOGETHER

4. Create an account on RPubs if you don't already have one. If you do, log in.



# LET'S PUBLISH OUR SLIDES TOGETHER

## 5. Enter your document details

The screenshot shows a web browser window for RPubs. The title bar reads "Not Secure — rpubs.com/cdhowe/524317/edit". The main content is a form titled "Document Details — Step 2 of 2". The form has three fields: "Title" with the value "Carl's revealjs presentation", "Description" (empty), and "Slug" with the value "http://rpubs.com/cdhowe/". A green box highlights the entire form area. At the bottom is a blue "Continue" button.

RPubs brought to you by RStudio

cdhowe

Document Details — Step 2 of 2

Title  
Carl's revealjs presentation

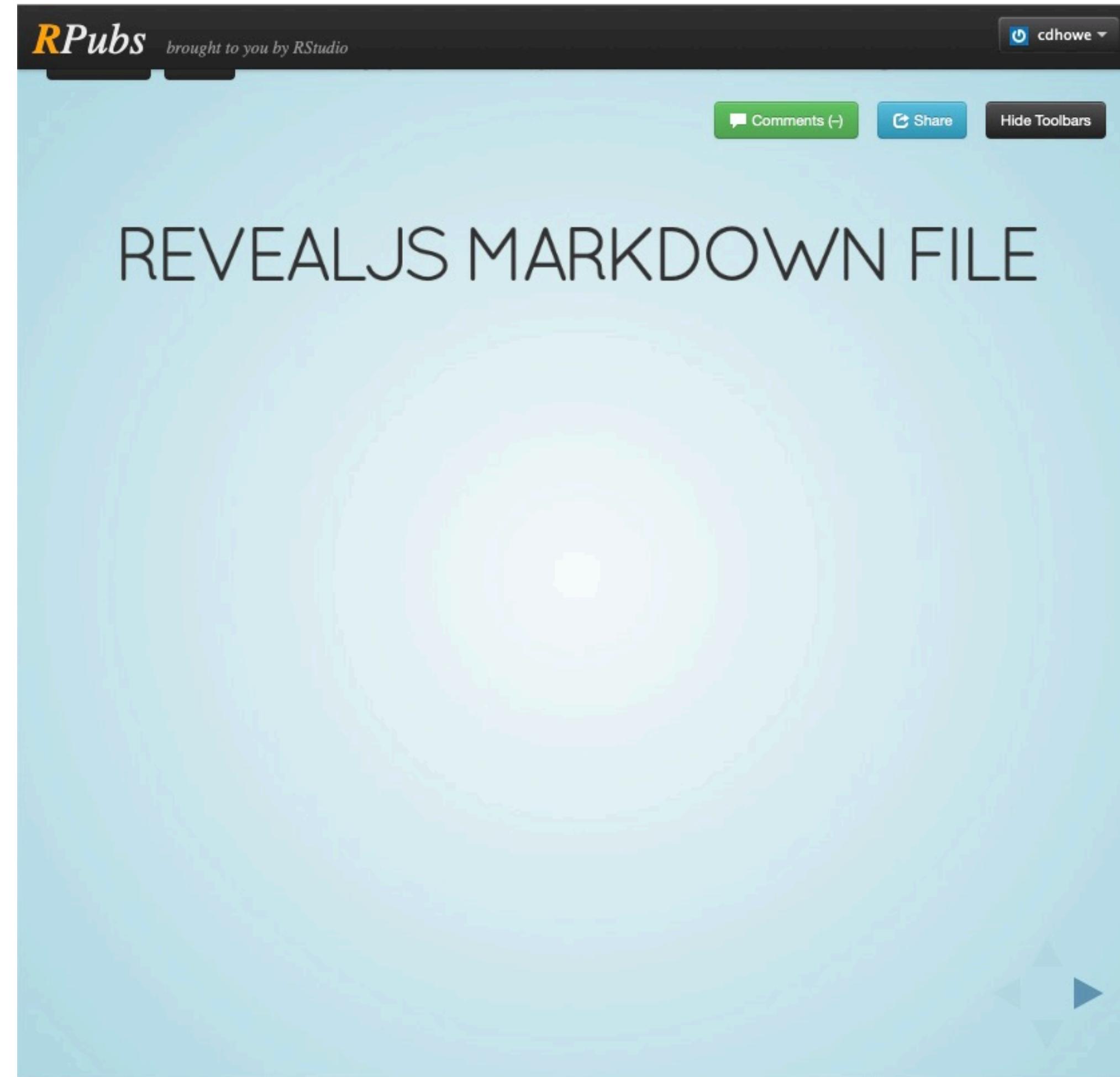
Description

Slug  
http://rpubs.com/cdhowe/

Continue

# LET'S PUBLISH OUR SLIDES TOGETHER

6. Our document is now published and live



# PUBLISH CAN SHARE HTML DOCS AND SHINY APPS

- [RPubs.com](#) will be our destination for HTML documents
- [shinyapps.io](#) will be our destination for Shiny apps
- RStudio Connect servers can handle both types of output
- We'll discuss the differences between the two types of documents and interactivity in our next module.

## Try A Powerpoint Presentation

1. Click on **23-Powerpoint-presentation.Rmd** in the Files pane
2. Knit the result
3. Unfortunately, rstudio.cloud has no way to view Powerpoint
4. Feel free to download and view your Powerpoint output if you have that software
5. Please note: Powerpoint documents can use .pptx files for formatting, but they must have very specific slide masters.
6. Also, Powerpoint documents aren't easily published unless you use a service such as Office 365

3m 00s

## Knit A Flex Dashboard

1. Click on **24-Simple-Flexdashboard.Rmd** in the Files pane
2. Knit the result
3. Try to figure out how our header types match the output

3<sub>m</sub> 00<sub>s</sub>

# Knit a Tufte Handout Using Templates

1. `install.packages('tufte')`
2. `library(tufte)`
3. Use New File > R Markdown > From Template
4. Choose the Royal Society Open Science Article template
5. Knit the result

3m 00s

# Knit a Xaringan Slide Deck Using Templates

1. `install.packages('xaringan')`
2. `library(xaringan)`
3. Use New File > R Markdown > From Template
4. Choose the **ninja presentation** template
5. Knit the result

3<sub>m</sub> 00<sub>s</sub>

# Load package `rticles` and Knit a Royal Society Open Science Article

1. `install.packages('rticles')`
2. `library(rticles)`
3. Use New File > R Markdown > From Template
4. Choose the Royal Society Open Science Article template
5. Knit the result

3<sub>m</sub> 00<sub>s</sub>

*R Markdown similar to that  
for reports and slides can also  
generate dashboards.*

# DOCUMENT TYPE DRIVES R MARKDOWN SYMBOL INTERPRETATIONS

R Markdown Symbol	Alternate Symbol	Document Meaning	Presentation Meaning	Dashboard Meaning
#	==	Header 1	New Section	Top level page
##	----	Header 2	New Slide	New layout section
###		Header 3	Slide Subhead	Layout subsection

We'll discuss layouts more when we get to Flexdashboards

# SUMMARY

## R Markdown

- Is a system for creating structured computational documents
- Can knit to many document types
- Can be shared using the publish button in the RStudio IDE
- Used for reports and slides can also generate dashboards.