Reports That Write Themselves

Using R Markdown to automate routine and repeatable reporting

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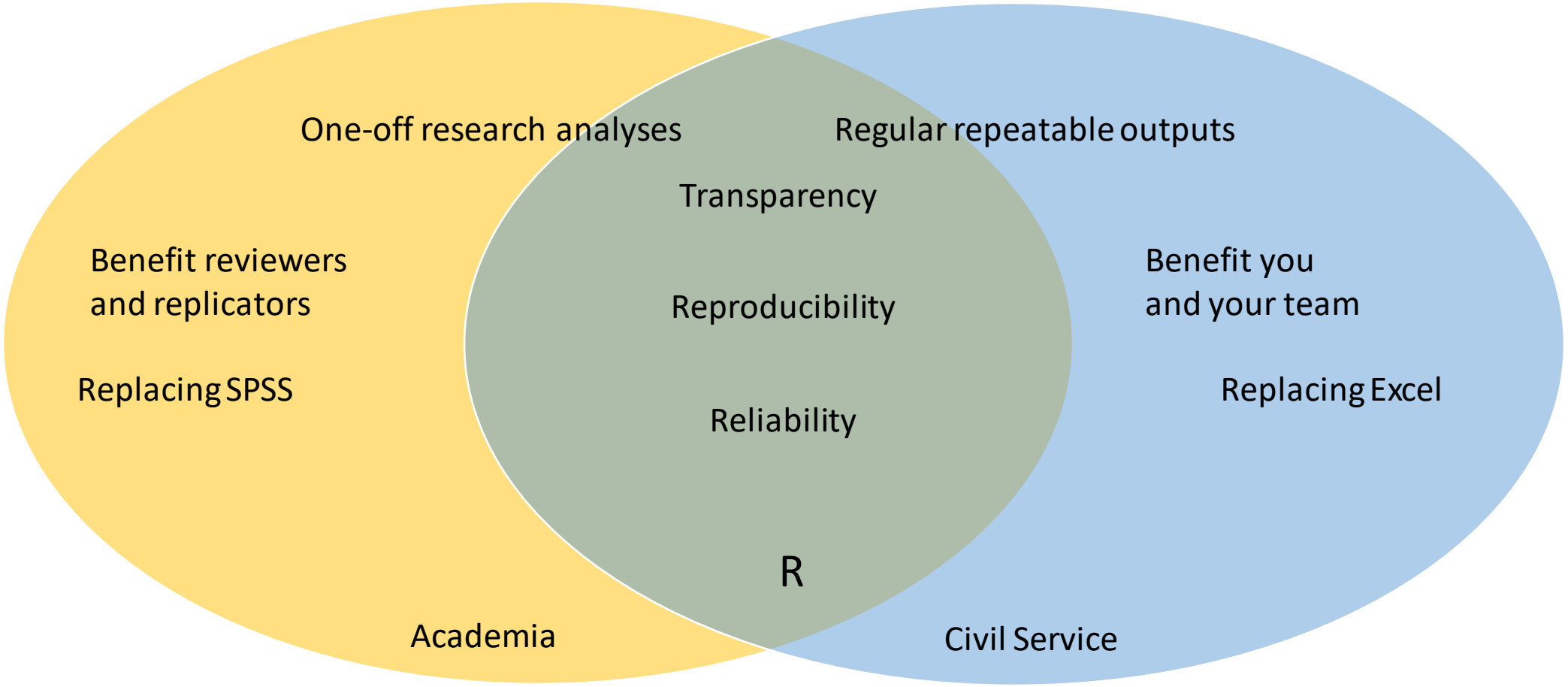
My background

- PhD in Psychology (University of Dundee, 2010)
- Started my R journey when working at University of Glasgow (2014-2016)
- Continued work at Edinburgh University (2016-2021)
- Now applying it every day working for the Scottish Government (2021-onwards)

Realities of reporting

- An image might be worth a thousand words…
- …But your stakeholders crave text
- Data that updates frequently

Reproducible Analytical Pipelines



[Reproducible Analytical Pipelines (RAP) – Government Analysis Function (civilservice.gov.uk)]

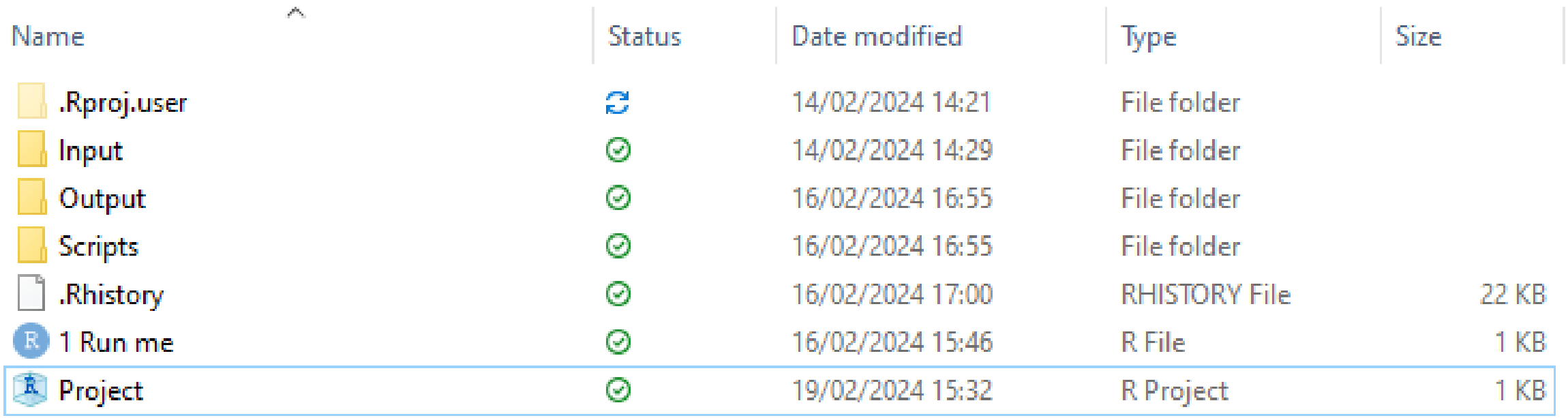
Caveats

- Demonstrating actual workflow with adapted code (the real deal is longer)
- We don’t have access to latest versions of R and packages – perils of open-source software

Objectives

- Working with real data published by Public Health Scotland
- Reproducible analysis that can be run weekly
- Summarising latest A&E statistics in a useful way
  - Comparing to last week
  - Comparing to equivalent week last year
  - Highlighting any record breakers
  - Year on year chart

Project structure



Name	Status	Date modified	Type	Size
.Rproj.user		14/02/2024 14:21	File folder	
Input		14/02/2024 14:29	File folder	
Output		16/02/2024 16:55	File folder	
Scripts		16/02/2024 16:55	File folder	
.Rhistory		16/02/2024 17:00	RHISTORY File	22 KB
1 Run me		16/02/2024 15:46	R File	1 KB
Project		19/02/2024 15:32	R Project	1 KB

rmarkdown (rstudio.github.io)

R Markdown: Basic structure

- Header

```
---
title: "A&E Report"
date: "`r Sys.Date()`"
output: html_document
---
```

- Setup

```
```{r setup, include=FALSE}
knitr::opts_chunk$set(echo = TRUE)
```
```

- Code

```
You can also embed plots, for example:

```{r, echo=FALSE}
# This is where you place code to be executed to generate variable_name
#`echo = FALSE` parameter prevents printing of the R code

```


This is where you write text.
To call on one of the R objects generated, use `r variable_name`
You can also use functions within this call: `r round(variable_name, 1)`
```

Simple demo

- Designed to show you the conditional statements in a pared down way
- Make it easy to play around with variable values to test all the possibilities
- Shows a few ways of constructing the comparisons

Full project

1 Run me.R*

Source on Save

```
#### This is an example project structure and running order####

# Call libraries
library(tidyverse)
library(readxl)
library(lubridate)

# Process data
source("Scripts/data_processing.R")


# Run and save an html report

rmarkdown::render("Scripts/report.Rmd", # run this markdown file
                  output_dir = "Output/", # where you want to save it
                  output_file = paste0("Performance for week ending ",
                                       # save using this name
                                       format(max_date, "%d %B %Y")))
                                      # including the formatted date
```

Data processing

- Find the right file, regardless of the date in the file name
- Read in data
- Adjust date format (POSIXct → Date) and add in week and year numbers

Report

- Set up a custom function that will put numbers into words
- Select correct dates
- Create a comparison table using those dates
- Use the table to create comparison statements
- Pick up if values are in the top/bottom 10 and add a sentence
- Look at attendance levels
- A detailed look at sites
- Year on Year chart with attendances

Curveballs and advice

- R Markdown has limited formatting capabilities when exporting to Word files.
- Some parts of code only run when RMD is called using source()
- If your data layout or values change drastically, you'll need to rethink
- Embrace trial and error!

Further reading on RAP in civil service

- Why we're getting our data teams to RAP - NHS Digital
- Reproducible Analytical Pipelines (RAP) – Government Analysis Function (civilservice.gov.uk)
- Analysis Function RAP Strategy 2023 implementation plan - Office for National Statistics (ons.gov.uk)