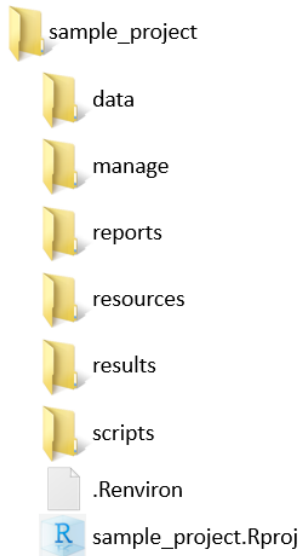


Principles for a reproducible workflow

497 / 597 Reproducible Research

Richard Layton

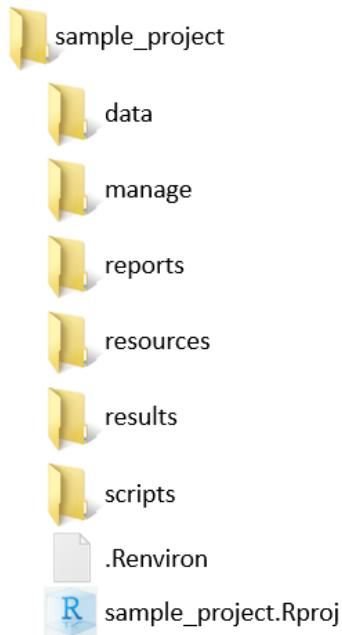
Rose-Hulman Institute of Technology
Fall 2018




Organize for reproducibility from the beginning

- ▶ Plan your directory structure
- ▶ Script everything — point/click/copy/paste is not reproducible
- ▶ Strive for simplicity & readability
- ▶ Link files explicitly
- ▶ Adopt a file naming scheme
- ▶ Use version control

From the beginning — plan your directory structure



From the beginning — plan your directory structure

 sample_project

▶ working directory (relative file paths start here)

 data


 manage


 reports

 resources


 results

 scripts

 .Renviron

 sample_project.Rproj

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▶ Rmd file(s) of the project report(s)

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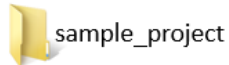
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 .Renviron

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manage

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reports

- ▶ Rmd file(s) of the project report(s)



resources

- ▶ images and pdfs from other sources



results



scripts

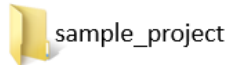


.Renviron



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reports

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resources

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results

- ▶ save script output (tidy data and graphs) here



scripts

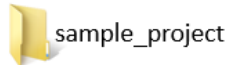


.Renvirom



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reports

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resources

- ▶ images and pdfs from other sources



results

- ▶ save script output (tidy data and graphs) here



scripts

- ▶ R files to tidy data, do analysis, & create graphs

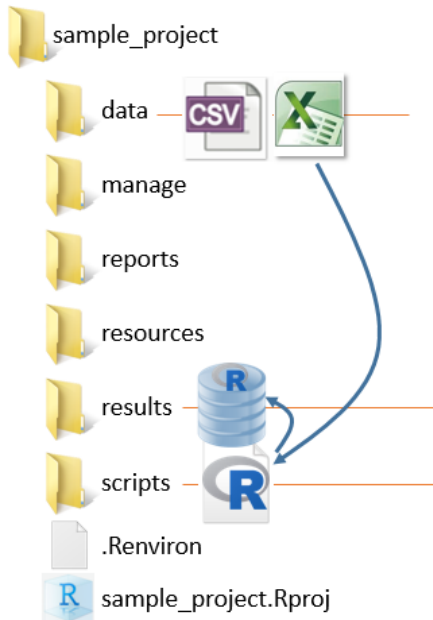


.Renvirom



sample_project.Rproj

Script everything

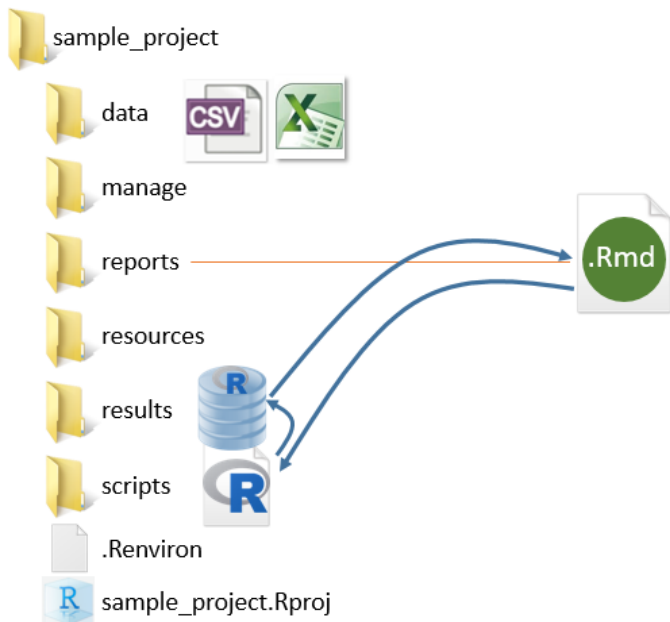


Use an R script to

- ▶ read a raw data file
- ▶ produce tidy data saved to results

Raw data files are stored unaltered.

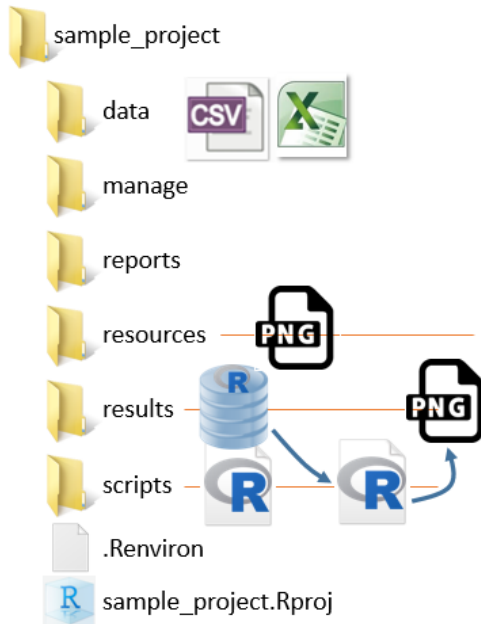
Link files explicitly



Start the Rmd script

- ▶ write prose to explain the work
- ▶ write R code chunks to execute the scripts
- ▶ import data from results to create data tables

Script everything



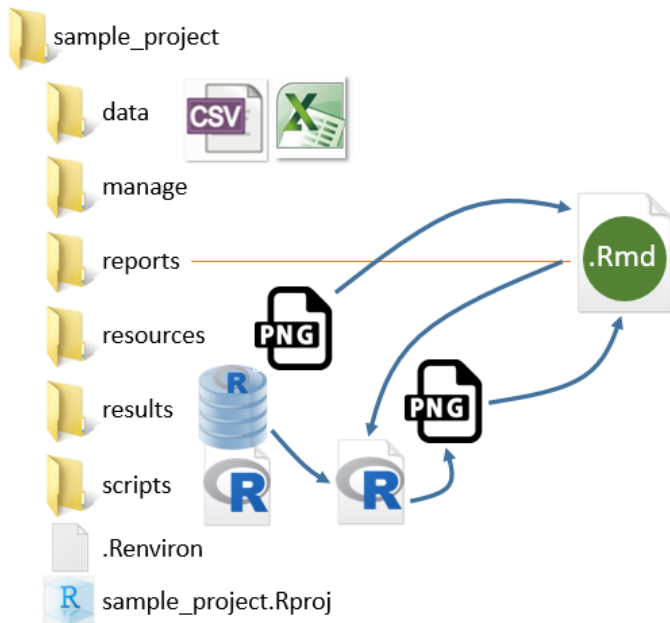
Use an R script to

- ▶ read tidy data from results
- ▶ produce a graph saved to results



Non-reproducible images stored in resources

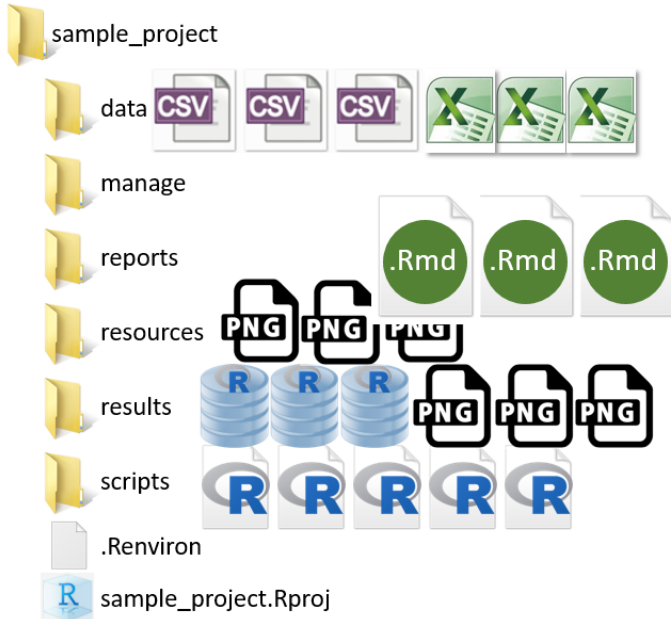
Link files explicitly



Continue the report

- ▶ write prose to explain the work
- ▶ write R code chunks to execute the scripts
- ▶ import images

Strive for simplicity & readability



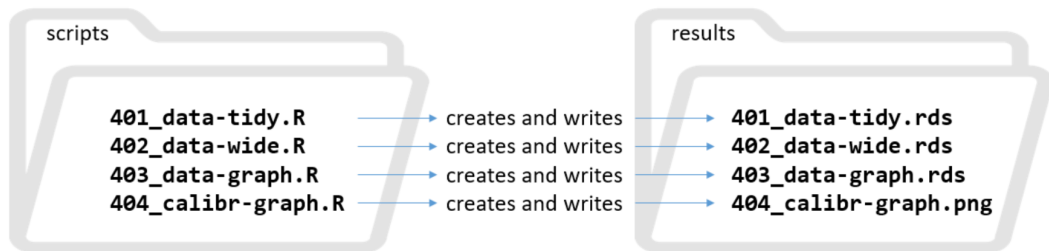
One Rmd script for each project milestone

- ▶ proposal
- ▶ progress report
- ▶ final report

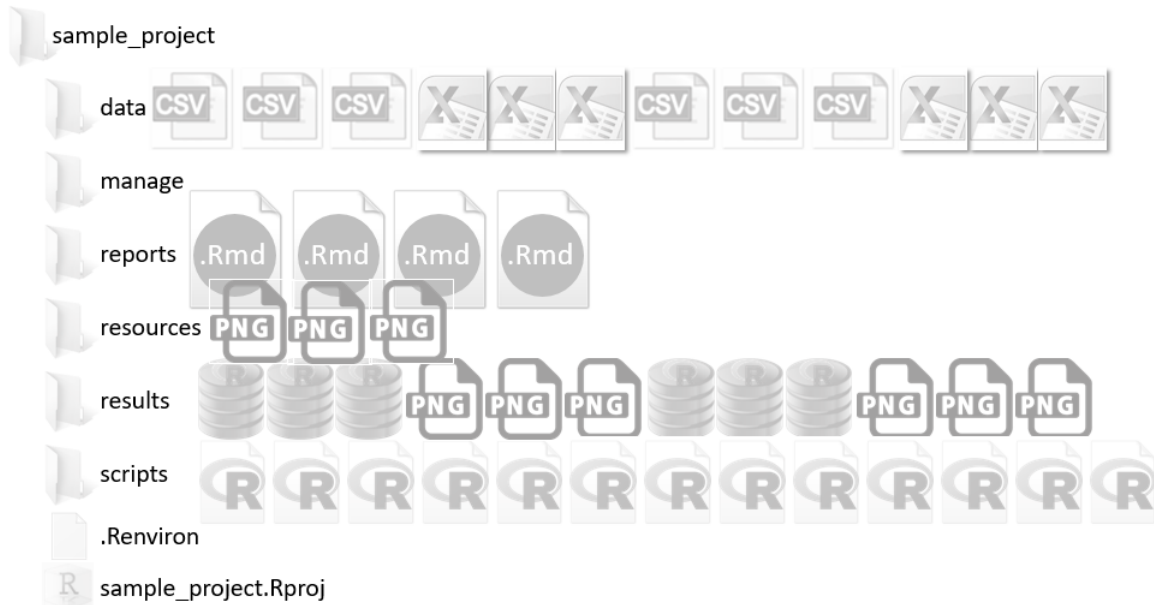
Strive for simplicity & readability

R scripts are generally short, between 60–100 lines, to

- ▶ produce one object written to file, e.g., CSV, PNG
- ▶ simplify editing, testing, & debugging
- ▶ improve readability



From the beginning — adopt a file naming scheme



In this scheme, every file name starts with 3 digits

Use “slugs” to facilitate file searches, for example `_report_`

000-series `manage`

`001_RFP_2018-05-25.pdf`
`002_contract_2018-06-05.pdf`
`invoice_201801.pdf`
`invoice_201802.pdf`

100-series `data`

`101_raw-data_2018-07-25.xlsx`
`102_raw-data_2018-08-01.xlsx`

200-series `resources`

`201_apparatus_2018-08-12.png`
`202_load-cell_2018-08-12.png`

300-series `reports`

`301_proposal_2018-07-05.Rmd`
`302_progress_2018-08-12.Rmd`
`303_report_2018-09-03.Rmd`

400-series `scripts`

`401_data-tidy.R`
`402_data-wide.R`
`403_data-graph.R`
`404_calibr-graph.R`

400-series `also used for results`

`401_data-tidy.rds`
`402_data-wide.rds`
`403_data-graph.rds`
`404_calibr-graph.png`

Use version control

See the website for instructions

GitHub



obtain a free account for asynchronous collaboration



create an online repository for each project



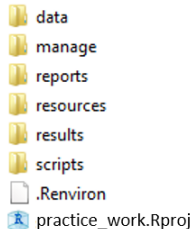
link each repository to a local RStudio Project



commit and push your changes to the repository

Create the folders after version control is set up

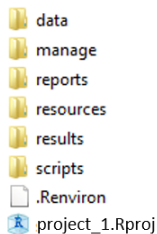
practice_work/



See the website for instructions

- ▶ the **.Rproj** file denotes the R Project working directory level

project_1/



- ▶ copy the **.Renviron** file to the top level of every project

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