

# Basic elements of file management

ME 447/547 Visualizing Data

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
Rose-Hulman Institute of Technology

# Effective file management starts at the beginning of a project

## Planning the structure

-  carpentry
-  data
-  data-raw
-  design
-  figures
-  reports
-  README.Rmd
-  portfolio.Rproj

## Naming files

-  d7\_survey-data-raw.csv
-  d7\_div-stack-bar.R
-  d7\_div-stack-bar.png
-  d7\_report.Rmd

## Linking files

```
source("carpentry/d7_extract-and-tidy.R")  
source("design/d7_div-stack-bar.R")  
source("data/d7_survey-data.csv")  
include_graphics("figures/d7_div-stack-bar.png")
```

## Planning the structure

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# The portfolio project has a mandatory structure

 carpentry 

 data 

 data-raw 

 design 

 figures 

 manage 

 practice 

 reports 

 resources 



























 .gitignore 

 .Renviron 



























 README.Rmd 

 portfolio.Rproj 














# Open **portfolio.Rproj** to start every work session

	carpentry	
	data	
	data-raw	
	design	
	figures	
	manage	
	practice	
	reports	
	resources	
	.gitignore	
	.Renviron	
	README.Rmd	
	portfolio.Rproj	 Sets the project directory as the working directory



























# README introduces your portfolio to the reader

	carpentry	
	data	
	data-raw	
	design	
	figures	
	manage	
	practice	
	reports	
	resources	
	.gitignore	
	.Renviron	
	README.Rmd	 Creates the main page of your portfolio website
	portfolio.Rproj	

## Other top-level files perform administrative duties














 carpentry	◀
 data	◀
 data-raw	◀
 design	◀
 figures	◀
 manage	◀
 practice	◀
 reports	◀
 resources	◀
 .gitignore	◀ Directs Git to ignore specific files
 .Renviron	◀ Stores packages in a library separate from base R
 README.Rmd	◀
 portfolio.Rproj	◀

## Raw data are never edited manually



























 carpentry	
 data	
 data-raw	 Data in its original form
 design	
 figures	
 manage	
 practice	
 reports	
 resources	
 .gitignore	
 .Renviron	
 README.Rmd	
 portfolio.Rproj	





























# Data carpentry converts raw data to tidy data

 carpentry	◁ R scripts that create and save tidy data
 data	◁ Tidy data saved here, read by design scripts
 data-raw	◁
 design	◁
 figures	◁
 manage	◁
 practice	◁
 reports	◁
 resources	◁
 .gitignore	◁
 .Renviron	◁
 README.Rmd	◁
 portfolio.Rproj	◁



























# Graph design converts to tidy data to graphs

 carpentry	
 data	
 data-raw	
 design	 R scripts that create and save graphs
 figures	 Graphs saved here, imported by report scripts
 manage	
 practice	
 reports	
 resources	
 .gitignore	
 .Renviron	
 README.Rmd	
 portfolio.Rproj	



























# Reports commingle data, scripts, graphs, prose, and references

 carpentry	
 data	
 data-raw	
 design	
 figures	
 manage	
 practice	
 reports	 One Rmd report per graph
 resources	
 .gitignore	
 .Renviron	
 README.Rmd	 Provides links to individual reports
 portfolio.Rproj	














## Resource files support the portfolio appearance and format

 carpentry	
 data	
 data-raw	
 design	
 figures	
 manage	
 practice	
 reports	 Reports explicitly call on resource files
 resources	 Image downloads and bibliography files
 .gitignore	
 .Renviron	
 README.Rmd	
 portfolio.Rproj	

# Reduce clutter by excusing some resources from version control

 carpentry	
 data	
 data-raw	
 design	
 figures	
 manage	 Correspondence and project management
 practice	 Scripts for practicing and learning R
 reports	
 resources	
 .gitignore	 Directs Git to ignore specific files
 .Renviron	
 README.Rmd	
 portfolio.Rproj	

# Summary

 carpentry	◁ R scripts that create and save tidy data
 data	◁ Tidy data saved here, read by design scripts
 data-raw	◁ Data in its original form
 design	◁ R scripts that create and save graphs
 figures	◁ Graphs saved here, imported by report scripts
 manage	◁ Correspondence and project management
 practice	◁ Scripts for practicing and learning R
 reports	◁ One report per display type
 resources	◁ Image downloads and bibliography files
 .gitignore	◁ Directs Git to ignore specific files
 .Renvirom	◁ Stores packages in a library separate from base R
 README.Rmd	◁ Creates the main page of your portfolio website
 portfolio.Rproj	◁ Sets the project directory as the working directory

# Summary

 carpentry

 data

 data-raw

 design

 figures

 manage

 practice

 reports

 resources

 .gitignore

 .Renviron

 README.Rmd

 portfolio.Rproj

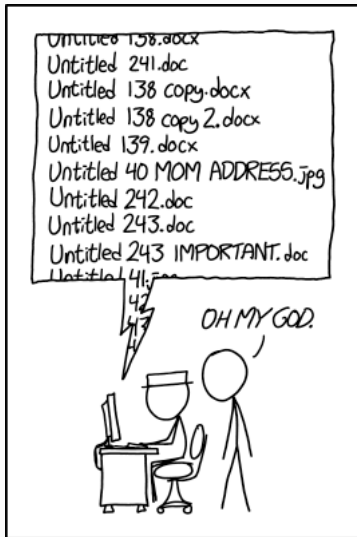
Use the given directory structure for the portfolio.

On future projects, your mileage may vary. You will probably adapt this structure to meet the needs of the new project.

# Naming files

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PROTIP: NEVER LOOK IN SOMEONE  
ELSE'S DOCUMENTS FOLDER.

Source: <https://xkcd.com/1459/>

Fail to plan

A file-naming scheme

And after a time

You are the meme.

# Three basic principles should guide your choice of filenames

Filenames should be **machine readable**

- use delimiters “\_” and “-” instead of spaces
- avoid symbols, punctuation marks, and case-sensitivity

Filenames should be **human readable**

- include information about the file content

Filenames should be **friendly to default ordering**

- start filenames with a numeric ID
- use leading zeros, e.g., 001, 002, ..., 999

# A sample set of portfolio file names illustrates the principles

Numeric display ID starts every file name: **d1, d2, ..., d7**

Hyphenated **content-information** supports human readability

```
carpentry/ d7_extract-and-tidy.R
data/      d7_survey-data.csv
data-raw/  d7_survey-data-raw.csv
design/     d7_div-stack-bar.R
figures/   d7_div-stack-bar.png
reports/   d7_report.Rmd
```

All lowercase, no special symbols, no spaces

Underscores support machine readability

## Add logical ordering when a process requires several files

Add a number 01, 02, etc., when related files are run in order

```
carpentry/ d7_01-extract-financials.R  
           d7_02-extract-mortality.R  
           d7_03-tidy-inequality-data.R
```

Add a number 01, 02, etc., when content is saved in different forms

```
data/      d7_01-survey-data.csv  
           d7_02-survey-data-wide.csv
```

## Linking files

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# Explicitly linking files supports reproducibility




Remove all ambiguity about what files are used to create a report


portfolio.Rproj sets the working directory and supports relative file paths

## Relative file paths document the **data tidying** workflow

Write an R script for data tidying

 **carpentry**/d7\_extract-and-tidy.R

In this R script, read the raw data

 `read_csv("data-raw/d7_survey-data-raw.csv")`

prepare it for graphing and write the dataframe

 `write_csv(dataframe, "data/d7_survey-data.csv")`

to the data directory

 **data**/d7\_survey-data.csv

## Use your **file-naming** scheme consistently

Write an R script for data tidying

 `carpentry/d7_extract-and-tidy.R`

In this R script, read the raw data

 `read_csv("data-raw/d7_survey-data-raw.csv")`

prepare it for graphing and write the dataframe

 `write_csv(dataframe, "data/d7_survey-data.csv")`

to the data directory

 `data/d7_survey-data.csv`




## Relative file paths document the **graph design** workflow


Write an R script for graph design

 **design**/d7\_div-stack-bar.R

In this R script, read the tidy data

 `read_csv("data/d7_survey-data.csv")`

create the graph and write the image

 `ggsave("figures/d7_div-stack-bar.png")`

to the figures directory

 **figures**/d7\_div-stack-bar.png

Again, note the **file-naming** scheme

Write an R script for graph design

 `design/d7_div-stack-bar.R`

In this R script, read the tidy data

 `read_csv("data/d7_survey-data.csv")`

create the graph and write the image


 `ggsave("figures/d7_div-stack-bar.png")`

to the figures directory

 `figures/d7_div-stack-bar.png`


# The **Rmd report** runs all the required files in order

Write an Rmd report

 **reports**/d7\_report.Rmd


containing the report text interleaved with code chunks that

run every R script for this display

```
 source("carpentry/d7_extract-and-tidy.R")
```

```
 source("design/d7_div-stack-bar.R")
```

import data to print a data table

```
 read_csv("data/d7_survey-data.csv")
```

and import the figures

```
 include_graphics("figures/d7_div-stack-bar.png")
```

## Again, note the **file-naming** scheme

Write an Rmd report

 **reports/d7\_report.Rmd**

containing the report text interleaved with code chunks that

run every R script for this display


```
 source("carpentry/d7_extract-and-tidy.R")
```

```
 source("design/d7_div-stack-bar.R")
```

import data to print a data table

```
 read_csv("data/d7_survey-data.csv")
```

and import the figures

```
 include_graphics("figures/d7_div-stack-bar.png")
```

# Effective file management summary

Plan your file and directory structure at the start of a project

Adopt a scheme to consistently name your files

Explicitly link files using relative file paths

# References

Bryan J (2015) Naming things. <https://speakerdeck.com/jennybc/how-to-name-files>

Bryan J (2018) Excuse me, do you have a moment to talk about version control? *The American Statistician* 72(1), 20–27 (doi:10.1080/00031305.2017.1399928)

Wilson G, Bryan J, Cranston K, Kitzes J, Nederbragt L and Teal TK (2017) Good enough practices in scientific computing. *PLoS Computational Biology* 13(6)  
<https://doi.org/10.1371/journal.pcbi.1005510>