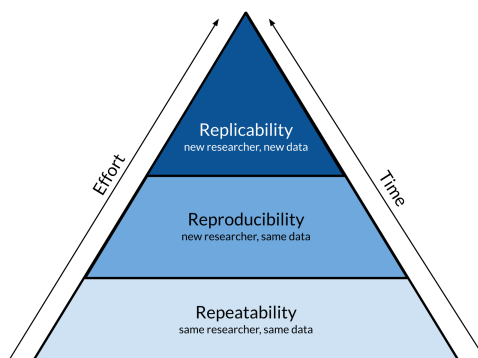# Reproducibility

Reproducibility

What's reproducibility?

A different analyst re-performs the analysis with the same code and the same data and obtains the same result.

Reproducibility vs Repeatability vs Replicability

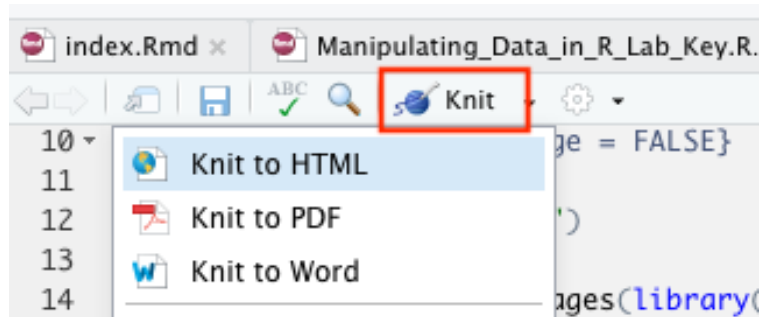Based off of a figure from Essawy et al, 2020 https://doi.org/10.1016/j.envsoft.2020.104753

Reproducibility

- Clean your environment regularly
- Use RMarkdown
- Check the knit of your RMarkdown regularly
- Tell your future self and others what you did!
- Print session info!

RMarkdown

Clicking the knit button, will knit your document to create different types of reports. The default is html.

Code Chunks

```r
```{r, echo = FALSE}
x<-2
```
```

```r
```{r, eval = FALSE}
x<-2
```
```

```r
```{r, message = FALSE}
x<-2
```
```

After knitting:
1) **echo** - determines if your code should be shown or not
- TRUE = code is **shown** (default)
- FALSE = code is not shown (but might be run. . . depends on eval)
2) **eval** - determines if your code should be evaluated (run) or not
- TRUE = code is **run** (default)
- FALSE = code is not run (but might be shown. . . depends on echo)
3) **message** = FALSE -suppresses messages when your run your code

RMarkdown syntax

Before:

```
# Header - biggest font created by hashtag and space
## SubHeader Second Biggest created by 2 hashtags and space

**bold** text
*italicized* text

`code` referenced outside of a chunk needs backticks
```

After knit:

RMarkdown syntax

Go to File > Help > Cheatsheets > R Markdown Cheatsheet

Final Project

Specific guidelines and example on website

Turn in through CoursePlus:
1) RMarkdown file
2) html file

Session Info

Session info helps

```
sessionInfo()
```

```
R version 4.0.5 (2021-03-31)
Platform: x86_64-apple-darwin17.0 (64-bit)
Running under: macOS Big Sur 10.16

Matrix products: default
BLAS:   /Library/Frameworks/R.framework/Versions/4.0/Resources/lib/libRblas.dylib
LAPACK: /Library/Frameworks/R.framework/Versions/4.0/Resources/lib/libRlapack.dylib

locale:
[1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8

attached base packages:
```

```
[1] stats     graphics  grDevices utils     datasets  methods   base

other attached packages:
 [1] forcats_0.5.1   stringr_1.4.0   purrr_0.3.4     tidyr_1.1.3
 [5] tibble_3.1.3    ggplot2_3.3.5   tidyverse_1.3.1 dplyr_1.0.7
 [9] readr_1.4.0     knitr_1.33

loaded via a namespace (and not attached):
 [1] tidyselect_1.1.1 xfun_0.25       haven_2.4.3     colorspace_2.0-2
 [5] vctrs_0.3.8      generics_0.1.0  htmltools_0.5.2 yaml_2.2.1
 [9] utf8_1.2.2       rlang_0.4.11    pillar_1.6.2    glue_1.4.2
[13] withr_2.4.2      DBI_1.1.1       dbplyr_2.1.1    modelr_0.1.8
[17] readxl_1.3.1     lifecycle_1.0.0 munsell_0.5.0   gtable_0.3.0
[21] cellranger_1.1.0 rvest_1.0.1     evaluate_0.14   fastmap_1.1.0
[25] fansi_0.5.0      broom_0.7.10    Rcpp_1.0.7      backports_1.2.1
[29] scales_1.1.1     jsonlite_1.7.2  fs_1.5.0        hms_1.1.0
[33] digest_0.6.27    stringi_1.7.3   grid_4.0.5      cli_3.0.1
[37] tools_4.0.5      magrittr_2.0.1  crayon_1.4.1    pkgconfig_2.0.3
[41] ellipsis_0.3.2   xml2_1.3.2      reprex_2.0.1    lubridate_1.7.10
[45] assertthat_0.2.1 rmarkdown_2.10  httr_1.4.2      rstudioapi_0.13
[49] R6_2.5.1         compiler_4.0.5
```