

# Getting the right tools for the job

R, RStudio, git, and GitHub

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# Outline

1. What is R?
2. Why use R?
3. What is RStudio?
4. Why use RStudio?
5. What is Git and GitHub?
6. Why use Git and GitHub?

# What is R?

- R is a simple but powerful *programming language*
- R is a system for *data manipulation*, *calculation*, and *graphics*. It provides:
  - Facilities/functions for data handling and storage;
  - A large collection of tools for data analysis; and,
  - Graphical facilities for data analysis and display.
- R is a programming language that provides statistical functions as part of a broader programming tool.



# Why use R?



- It is an *open source system* and is available for *free*. Even though free, R is *more powerful than most commercial packages*.
- Considerably *more flexible than statistical packages* that relies on menus, buttons, and boxes.
- Every stage of your data management and analysis can be recorded and edited and re-run at a later date.
- huge user and developer community.
- has a robust set of user- and community-developed packages that support statistical methods and techniques.

# What is RStudio?

- An *integrated development environment (IDE)* for R. RStudio is not R. RStudio is a tool for interfacing with R.
- Includes a *console, syntax-highlighting editor* that supports direct code execution, as well as *tools for plotting, history, debugging and workspace management*.



# Why use RStudio?

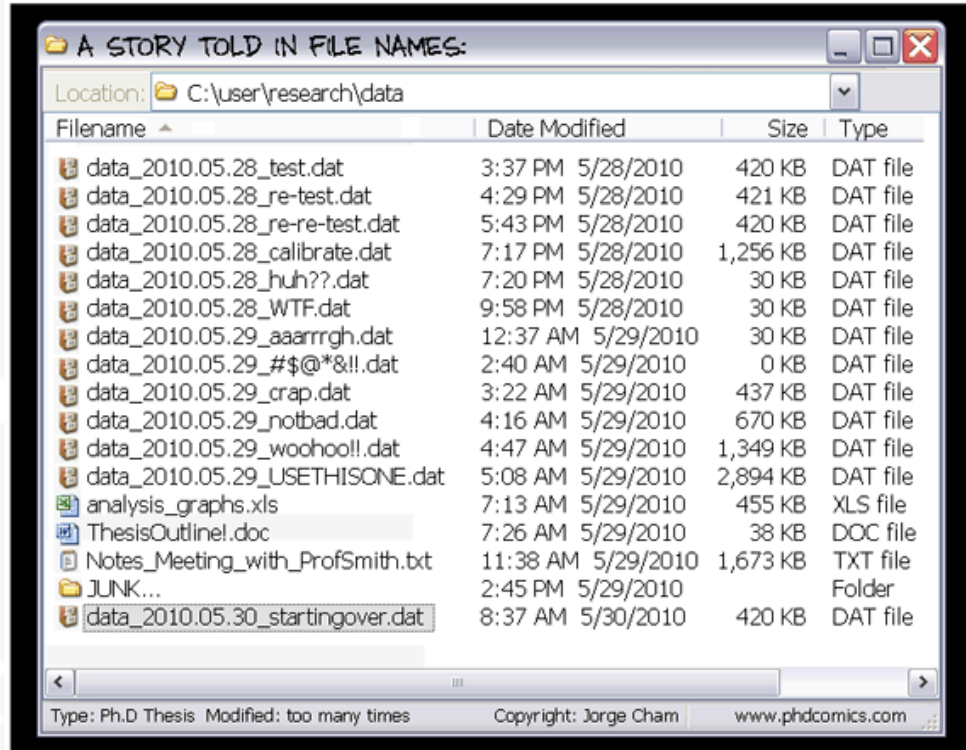
- RStudio is designed to make it easier to work with R
- RStudio facilitates creation of project-orientated workflows
- RStudio makes it convenient to view and interact with the objects in your environment

# What is git?

- Free and open source distributed **version control system**
- Built for software development for a group of developers to work collaboratively and to manage the evolution of a set of files
  - like "*Track Changes*" in Microsoft Word on steroids!
- Has been re-purposed to manage a collection of files that make up a typical data analytical project that consists of data, figures, reports, and source code



# Why use git?

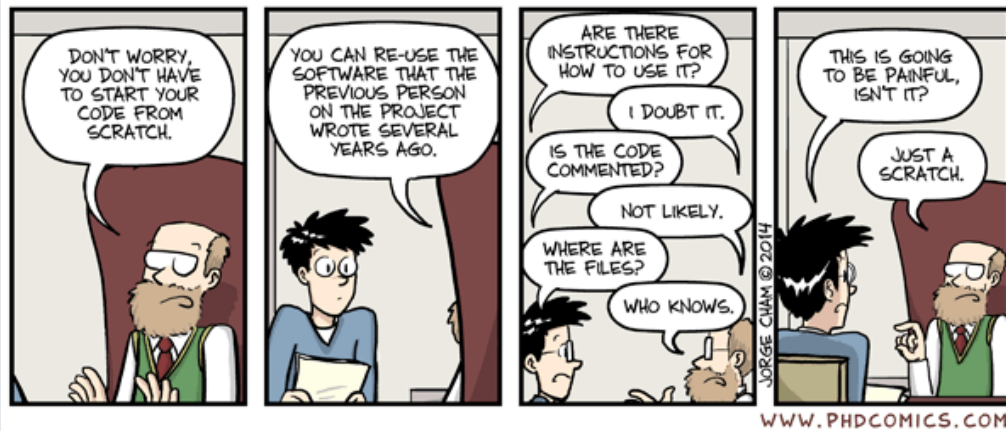


## Version control

- Is the only reasonable and sane way to keep track changes in source code, manuscripts, presentations, and data analysis projects
- Documentation of differences between versions
- Exploration of differences between versions



# Why use git?



## Communication and collaboration

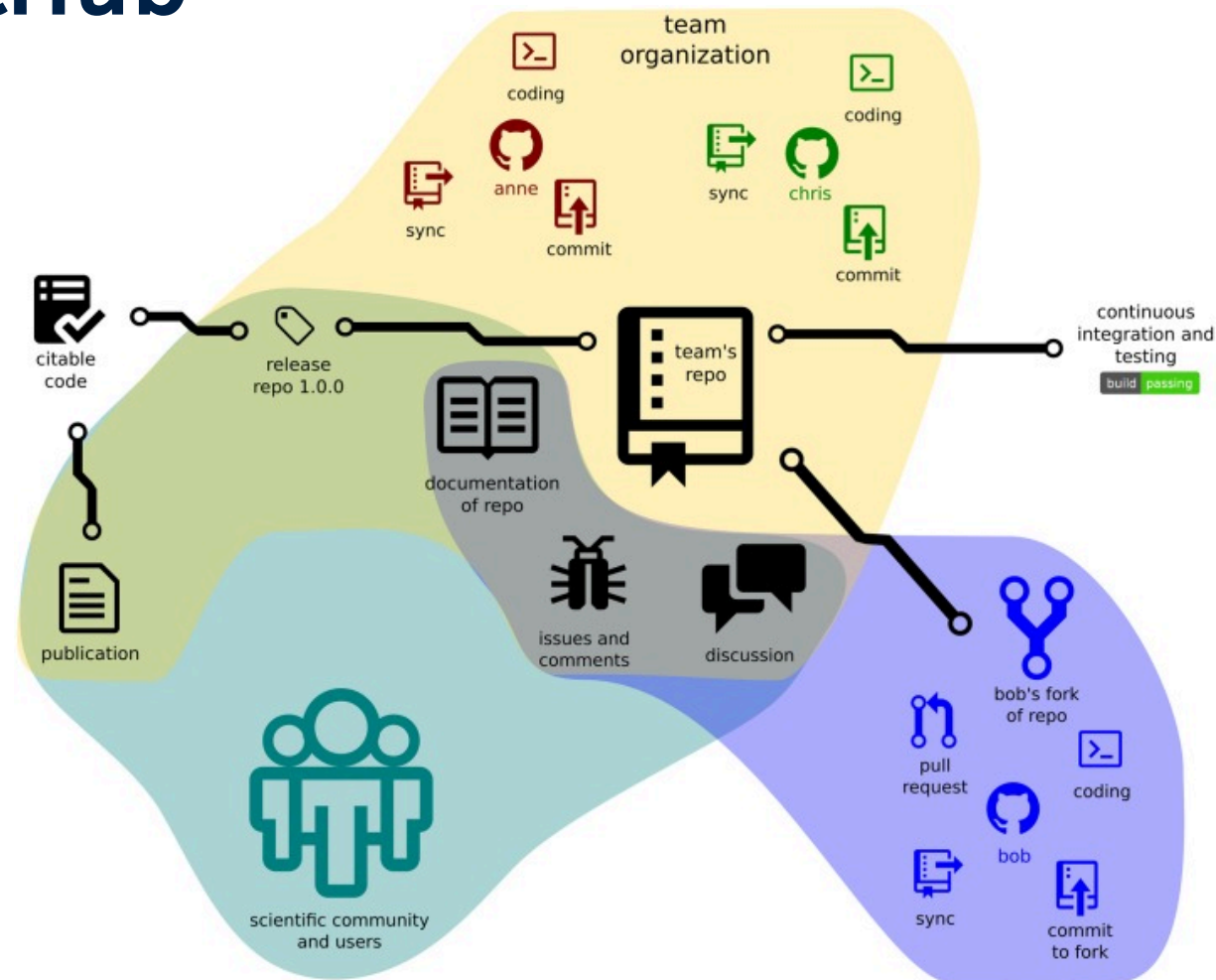
- **Communicating** one's research project with other people is part of the scientific process - not just results but the whole process
- **Collaborating** with others on each other's research project allows us to build on each other's past work, using them for a different context/problem, or re-purposing them to come up with a new approach/solution
- Communication and collaboration on various aspects of the scientific process is facilitated by using git

# What is GitHub and Why use GitHub?



- Service provider of hosting for software development and version control using git
- Offers distributed version control and source code management functionality of git, plus its own features such as bug tracking, feature request, task management, continuous integration and wikis for every project
- Like *facebook* but for programmers
- Facilitates "*openness*" of **Open Source**
- Lowers the barriers to collaboration

# git and GitHub



Taken from Perez-Riverol, Y., Gatto, L., Wang, R., Sachsenberg, T., Uszkoreit, J., Leprevost, F., Fufezan, C., Ternent, T., Eglen, S. J., Katz, D. S., Pollard, T. J., Kononov, A., Flight, R. M., Blin, K., & Vizcaíno, J. A. (2016). Ten Simple Rules for Taking Advantage of Git and GitHub. *PLoS computational biology*, 12(7), e1004947. <https://doi.org/10.1371/journal.pcbi.1004947>

Questions?

# Practical session

Basic git operations with RStudio for retrieving and submitting assignments via GitHub Classroom

# Thank you!

Slides can be viewed at <https://oxford-ihtm.io/open-reproducible-science/session1.html>

PDF version of slides can be downloaded at <https://oxford-ihtm.io/open-reproducible-science/pdf/session1-getting-the-right-tools.pdf>

R scripts for slides available [here](#)