Welcome to the Workshop!

Workshop Website
http://sarahlrstevens.info/2017-08-02-chicago-frb/

Etherpad (for collaborative notes)
http://pad.software-carpentry.org/2017-08-02-chicago-frb

Pre-Workshop Survey
https://www.surveymonkey.com/r/swc_pre_workshop_v1

Check your setup!

Open GitBash (Windows), and type the following:

`python --version`
Raise your hand if you DON'T have version **3.5.x** (where x can vary).

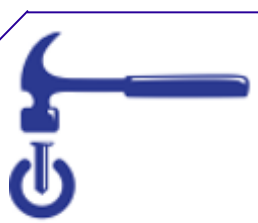
`python -c "import pandas"`
Raise your hand if you get an error.

`git --version`
Raise your hand if you get an error.

Welcome to Software Carpentry!
August 2-3, 2017

Instructors:
Prateek Mehta
Sarah Stevens

Hosts:
Deng Pan
Ken Housinger



What is ‘Software Carpentry’??

- Non-profit, international organization
- Teaches workshops to help researchers adopt reproducible computational practices
- Instructors are all volunteers
- Materials developed by open science community
- Code-along learning model

Code of Conduct

- http://software-carpentry.org/conduct/
- Harassment includes offensive verbal comments related to gender, sexual orientation, disability, physical appearance, body size, race, religion, sexual images in public spaces, deliberate intimidation, stalking, following, harassing photography or recording, sustained disruption of talks or other events, inappropriate physical contact, and unwelcome sexual attention.
- All communication should be appropriate for a professional audience including people of many different backgrounds. Sexual language and imagery is not appropriate for any event.
- Be kind to others. Do not insult or put down other attendees.
- Behave professionally. Remember that harassment and sexist, racist, or exclusionary jokes are not appropriate.

Workshop Logistics: Where Stuff Is

Restrooms
Across the hall

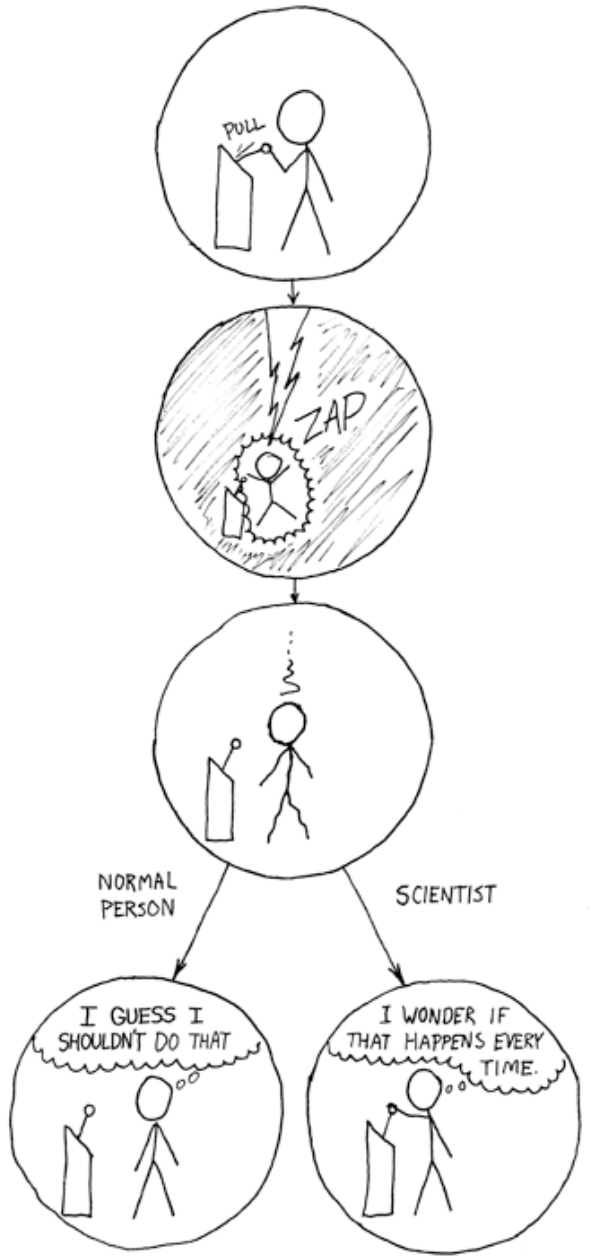
Beverages
Drinking fountain: across the hall
Coffee/tea: front left corner of room, all day

Lunch
On your own.
Need a fridge? Let us know.

If You Can't Reproduce It, Is It Still Science?

And how long will it take?

Inspired by Greg Wilson,
Software Carpentry



https://xkcd.com/242/

Reality of Research Computing

- Many scientists/researchers spend most of their time developing, maintaining, or running software
  - Most don’t consider themselves software engineers
  - Few have ever been taught how

So what?

- Most results take longer to produce than they need to
- Difficult to assess quality

Software Carpentry to the Rescue

- Best practices used by the best software engineers whose business is development of quality software
  - They don’t always have formal training
  - They don’t always follow all the practices
  - Growing evidence supported by empirical studies

Software Carpentry Practices

- Write software for people, not computers
- Automate repetitive tasks
- Use the computer to record history
- Make incremental changes
- Use version control
- Don’t repeat yourself
- Plan for mistakes
- First make it correct, then make it fast
- Document design & purpose, not just mechanics
- Conduct code reviews

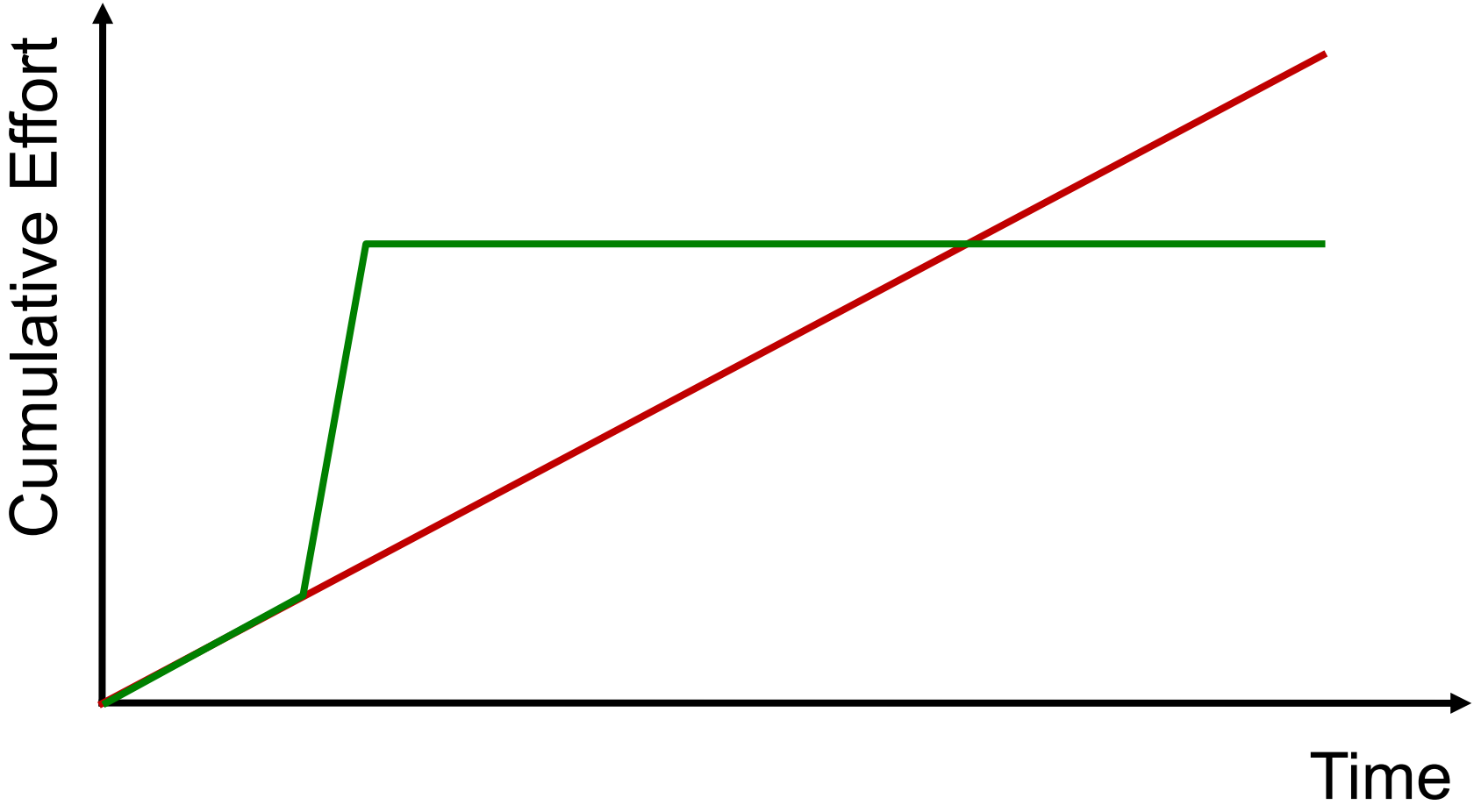
Wilson et al. (2014) Best practices for scientific computing. PLoS Biology 12: e1001745

Good Enough Practices

- Data management - saving both raw and intermediate forms, documenting all steps, creating tidy data amenable to analysis
- Software - writing, organizing, and sharing scripts and programs used in an analysis
- Collaboration - making it easy for existing and new collaborators to understand and contribute to a project
- Project organization - organizing the digital artifacts of a project to ease discovery and understanding
- Tracking changes - recording how various components of your project change over time
- Manuscripts - writing manuscripts in a way that leaves an audit trail and minimizes manual merging of conflicts

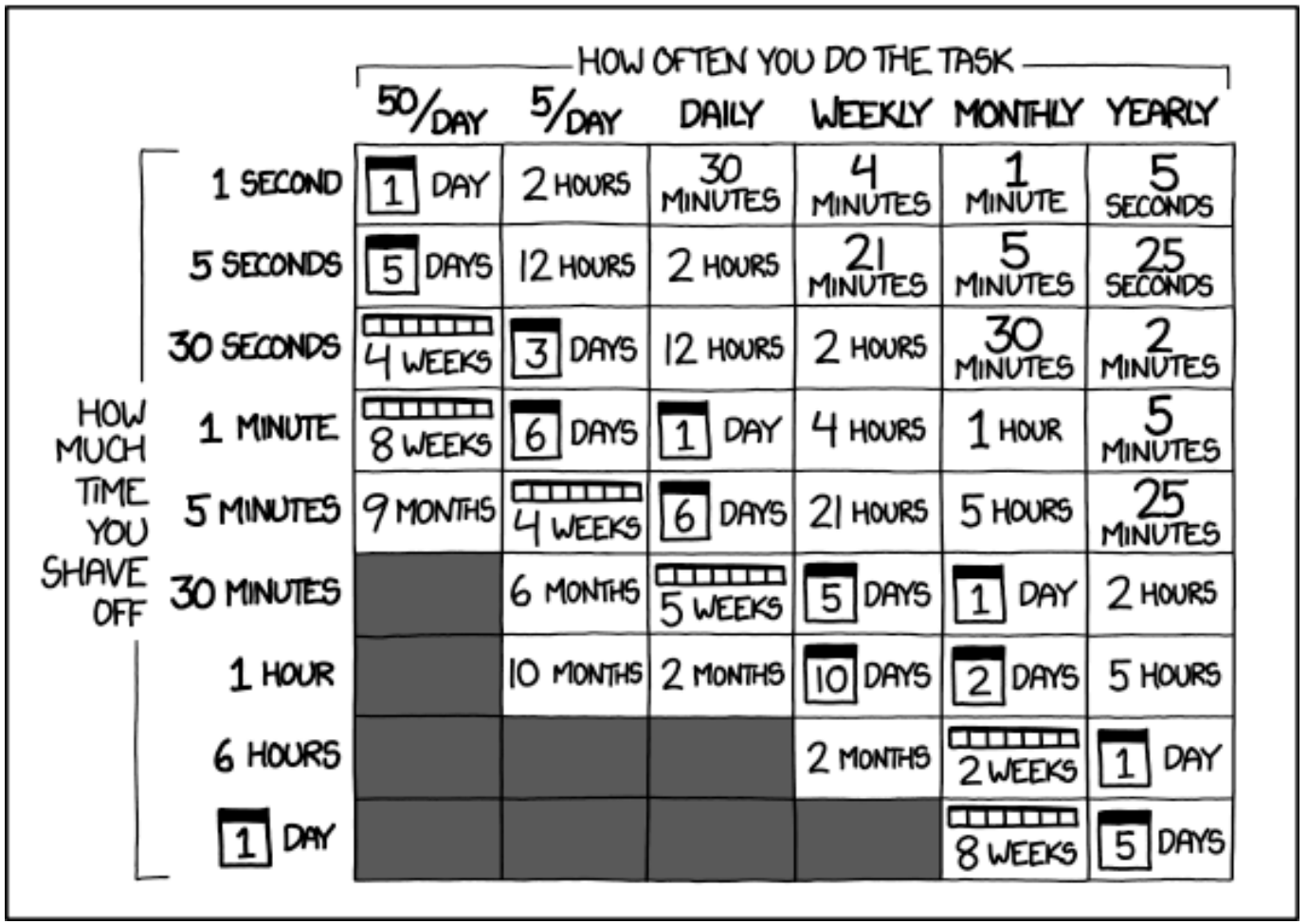
Wilson et al. (2017) Good enough practices in scientific computing. PLoS Comput Biol 13(6): e1005510

Thoughts on Productivity and Automation



Thoughts on Productivity and Automation

HOW LONG CAN YOU WORK ON MAKING A ROUTINE TASK MORE EFFICIENT BEFORE YOU'RE SPENDING MORE TIME THAN YOU SAVE?
(ACROSS FIVE YEARS)



https://xkcd.com/1205/

Karen Cranston
@kcranstn

Follow

@mtholder motivating git: You mostly collaborate with yourself, and me-from-two-months-ago never responds to email. @swcarpentry

RETWEETS 25 LIKES 15

7:23 AM - 23 Aug 2013

25 15

http://bit.ly/motivate_git)

Make Incremental Changes Redux

- Choose one practice
  - Implement it in your work
  - Share it with your lab group
  - Allow it to sink in
- Repeat

Where to Start?

- Depends on the nature of your work
- Consider the purpose:
  - Improve productivity
  - Improve quality

Workshop Logistics: Continuous Feedback

Post-It Usage #1
green sticky up – exercise completed
red sticky up – exercise in progress; HELP!
nametag down – all is okay

Post-It Usage #2
At each break, indicate something that was good and something that could be better.

Post-Workshop Survey
You'll receive a link from us after the workshop.

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Why Learn the Shell?

- Installing software
- Configuring your computer
- Controlling remote machines
- Running scripts from others
- Writing your own scripts/pipelines