



Welcome to Software Carpentry!

June 3-4, 2015

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If You Can't Reproduce It,
Is It Still Science?
And how long will it take?

Inspired by Greg Wilson,
Software Carpentry



Reality of Research Computing

- Many scientists 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



Reinhart & Rogoff (2010)

Widely-cited study that justified economic austerity policies
(effect of debt on a country's growth)

- Data omissions
- Questionable methods of weighting
- Coding errors

[`bit.ly/reinhart_rogoff`](https://bit.ly/reinhart_rogoff)



Software carpentry

- 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 mechanics
- Conduct code reviews

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



Your closest collaborator is you six months ago,
but you don't reply to emails.



Make Incremental Changes Redux

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

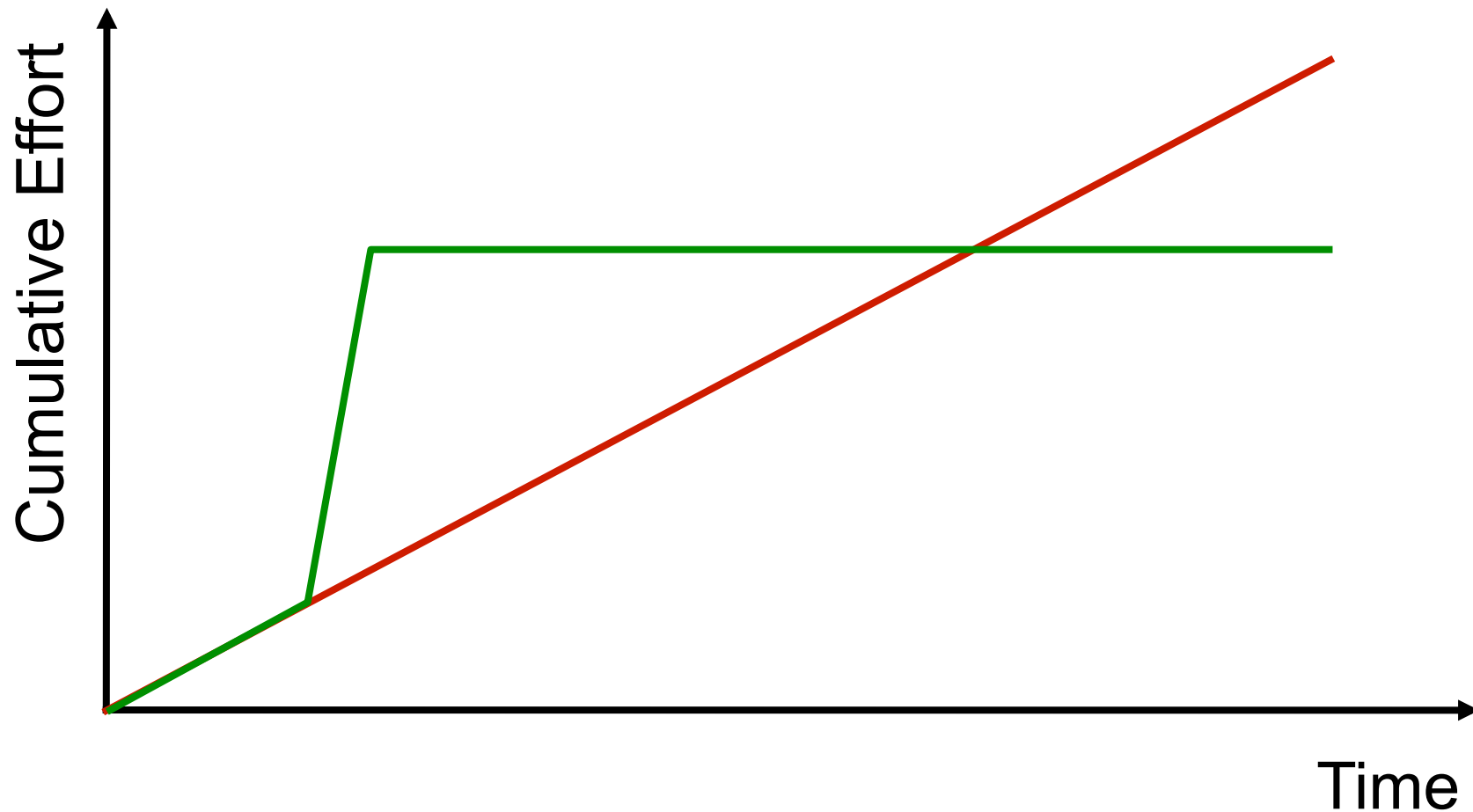


Where to Start?

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



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)

		HOW OFTEN YOU DO THE TASK					
		50/DAY	5/DAY	DAILY	WEEKLY	MONTHLY	YEARLY
HOW MUCH TIME YOU SHAVE OFF	1 SECOND	1 DAY	2 HOURS	30 MINUTES	4 MINUTES	1 MINUTE	5 SECONDS
	5 SECONDS	5 DAYS	12 HOURS	2 HOURS	21 MINUTES	5 MINUTES	25 SECONDS
	30 SECONDS	4 WEEKS	3 DAYS	12 HOURS	2 HOURS	30 MINUTES	2 MINUTES
	1 MINUTE	8 WEEKS	6 DAYS	1 DAY	4 HOURS	1 HOUR	5 MINUTES
	5 MINUTES	9 MONTHS	4 WEEKS	6 DAYS	21 HOURS	5 HOURS	25 MINUTES
	30 MINUTES		6 MONTHS	5 WEEKS	5 DAYS	1 DAY	2 HOURS
	1 HOUR		10 MONTHS	2 MONTHS	10 DAYS	2 DAYS	5 HOURS
	6 HOURS				2 MONTHS	2 WEEKS	1 DAY
	1 DAY					8 WEEKS	5 DAYS