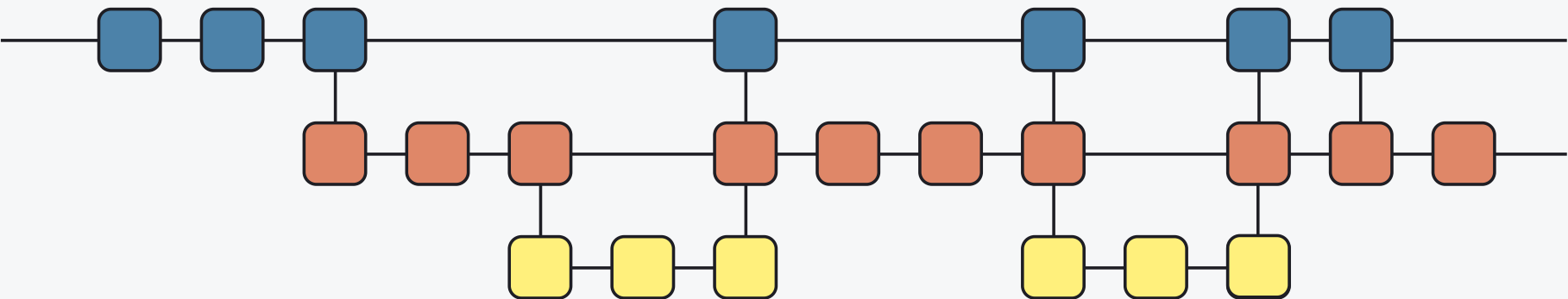




start your lab

Best practices for modern social science



Today's Agenda

1. What does modern social science look like?
2. Why are we here today?
3. What are best practices and why are they important?
4. How do we get our lab started with best practices for teams?
5. How do we leverage modern tools as a lab? a department? a field?

What does modern social science look like?



Open science is increasingly emphasized

- Collaboration between teams and fields
- Reusing others' materials and reproducing findings
- Public accessibility
- Many powerful drivers
 - Journals, funders, individuals, scientific societies



Complex problems need computing resources

- Experiments are more powerful, creative, and complex
- Analyses increasingly rely on computationally-intensive approaches



Global networks are more common

- Academics are increasingly working with people outside their lab, department, university, or even academia itself.
- If people leave academia for the private sector, *wherever they go*, the best possible practices are used and expected.
 - Facilitating better research practices is good for academics, increasingly common in academia, and crucial outside of academia

Modern social science looks like...



Open Science



Complex Problems



Global Networks

Modern social science looks like...



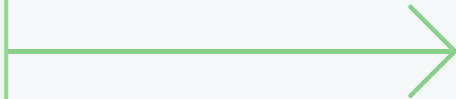
Open Science



Complex Problems



Global Networks

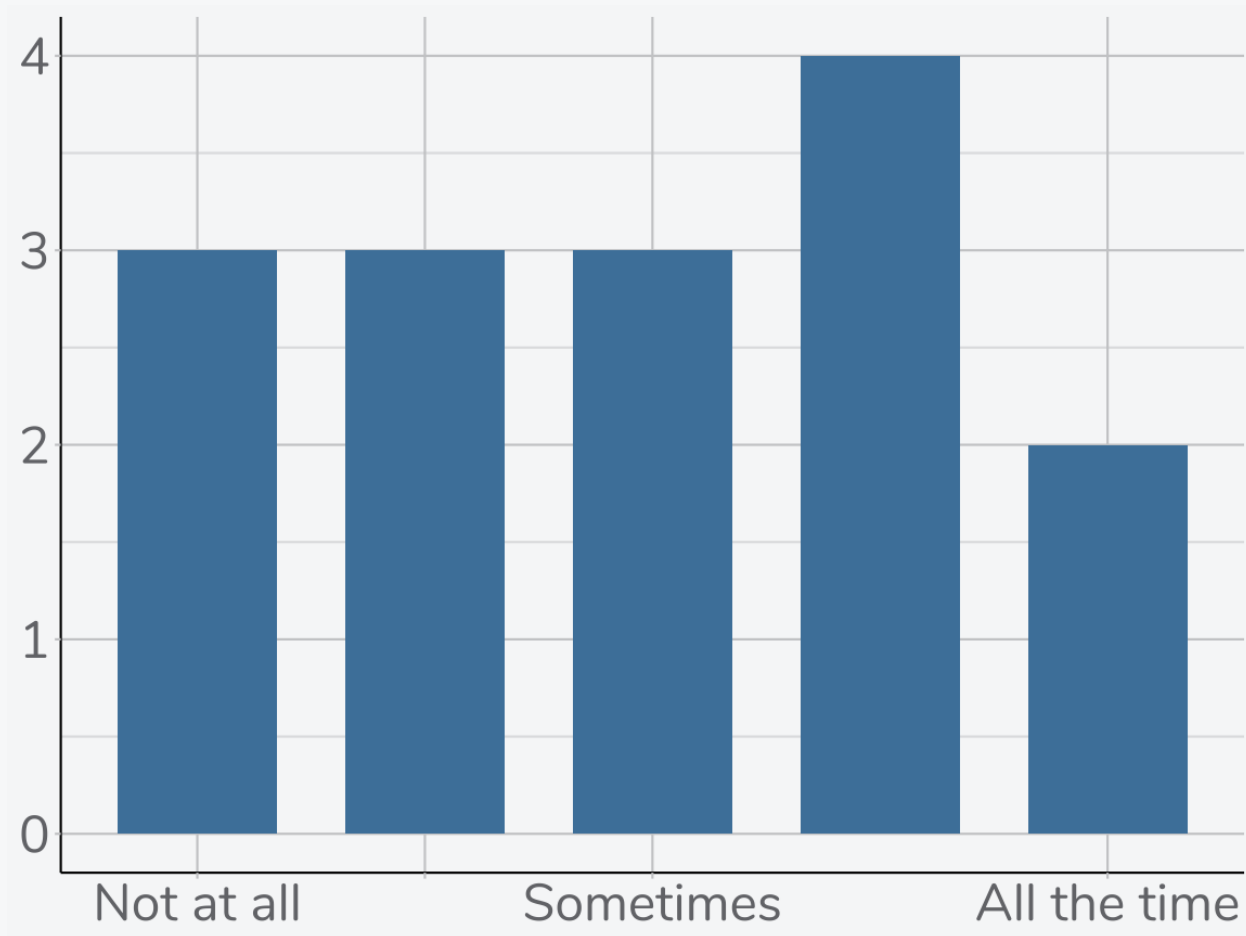


Team Science

Why are we here today?

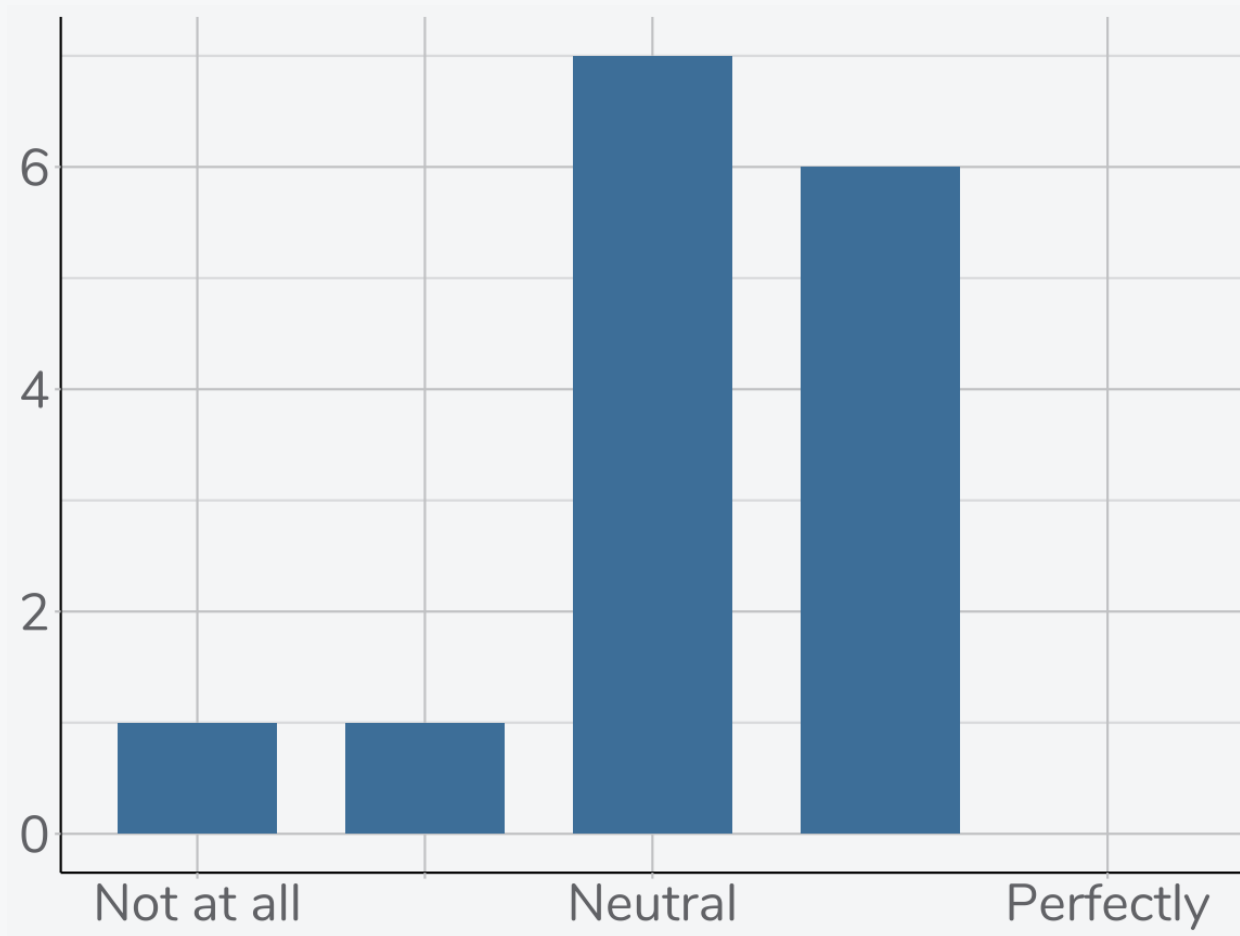
We can't keep track of different versions

How often do you store and spend time searching for file versions?



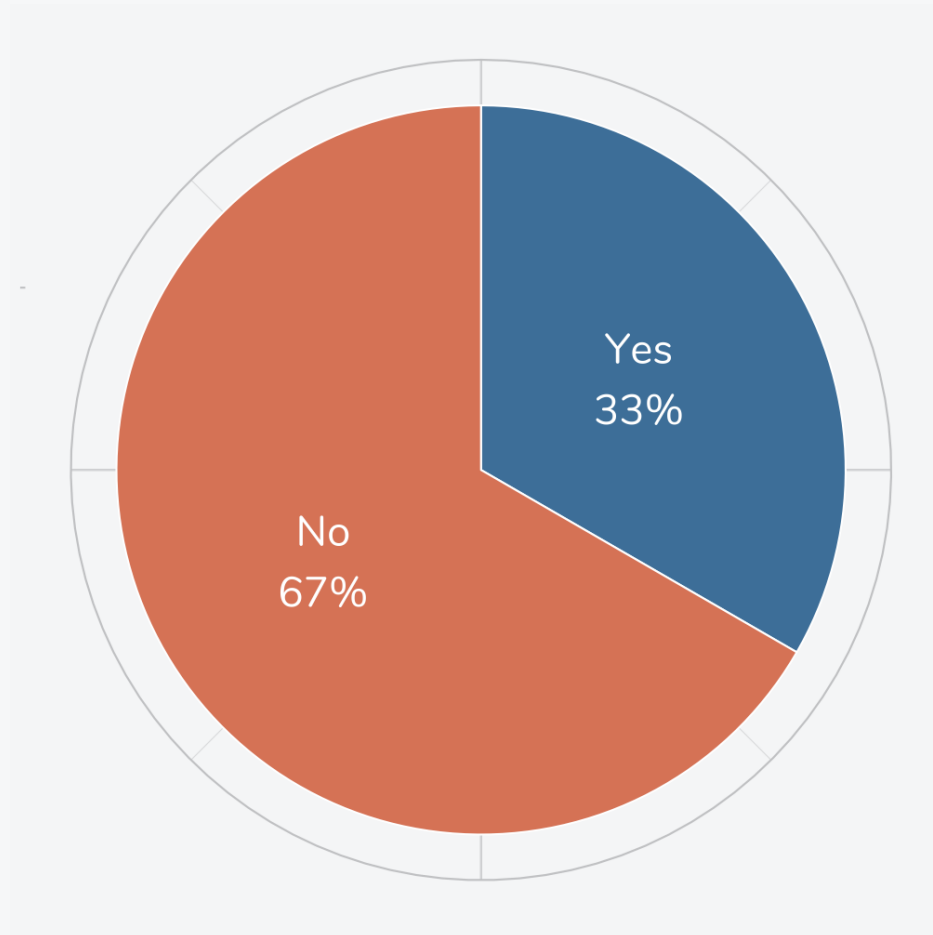
We can't find files confidently

How organized do you feel your project files are?



We can't share without extra effort

Are you able to share analysis files with collaborators with one or two clicks without doing any editing to the file?



Continuing current research practices has costs

1. They are expensive in both time and effort

- This is **hours of your time and others' time, wasted.**

2. They lead to risk of serious errors

- This is **mistakes in publications and unnecessary confusion.**

3. They make collaboration harder than it needs to be

- This is **lost opportunities and lost innovation.**

We can do better by using *best practices*

What are best practices and
why are they important?

Best practices are...

- methods
- strategies
- techniques
- procedures
- etc.

...that are generally agreed upon as the **most effective** or **most prudent** way to work.

Best practices are vital to successful collaboration with your team, projects, and code.

Who agrees upon these "best" practices?

The private sector

...especially those in **software and technology** who carry out their entire professional lives in this setting with tremendous incentives & desire to improve, streamline, and facilitate digital work.

Who agrees upon these "best" practices?

Other academics

Ram, 2013, Git can facilitate greater reproducibility and increased transparency in science, *Source Code for Biology and Medicine*

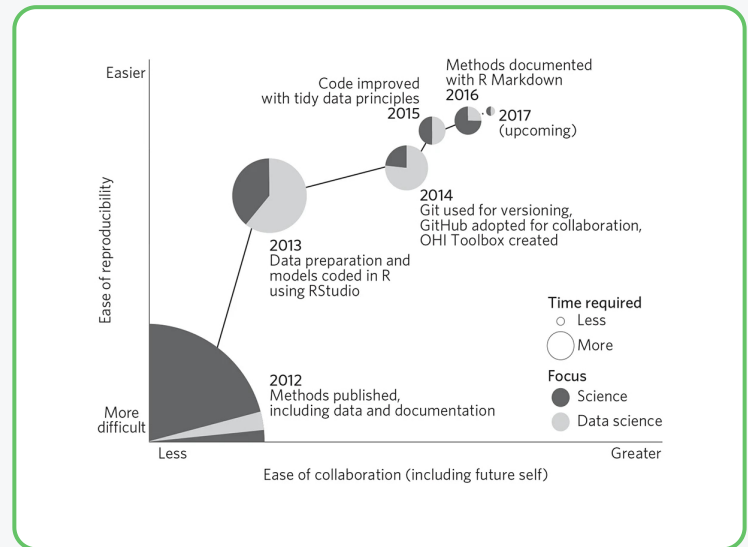
Wilson et al, 2014, Best practices for scientific computing, *PLoS Biology*

Gorgolewski & Poldrack, 2016, A practical guide for improving transparency and reproducibility in neuroimaging research, *PLoS Biology*

Lowndes et al, 2017, Our path to better science in less time using open data science tools, *Nature Ecology & Evolution*

Wilson et al, 2017, Good enough practices in scientific computing, *PLoS Computational Biology*

Hesse, 2018, Can psychology walk the walk of open science?, *American Psychologist*



What is the value of adopting best practices?

Best practices are consistent with **our scientific values**

- Better science
 - More reusability
 - More reproducibility
 - Fewer errors
- Transparency
- Efficiency
- More attractive collaborator
- Fast onboarding of new lab members
- Supports young scholars
- Intentional organization of digital lab materials

Future-proofing

This is and will be the standard for years to come

How do we get our lab started
with best practices for teams?

It starts with the best tools for teams



Start **communicating** with Slack

- Can be asynchronous, can be synchronous
- Designed for teams with multiple people coordinating unevenly across multiple projects in shifting ways over time
- Can be 1:1 private, shared within a small group, or shared with everyone, all within the same platform
- Stores your communication and makes it easy to find later
- Connects with nearly every other modern tool for teams

Who else uses Slack?

As of 2019, Slack had **10+ million daily active users**, and 87% of users state that Slack improves their entire work process



Start **scheduling** with Google Calendar

- Designed for teams with multiple projects and various meeting needs
- Both public and private calendar events to schedule weekly lab meetings and one-on-one meetings
- It is more accessible for external collaborators than Outlook

Who else uses Google Calendar?

As of 2018, at least **500 million people** use Google Calendar



Start **developing** with GitHub

- Provides a shared interface for all digital materials in the cloud
- Relates ideas and conversation directly to code
- Tracks informative, detailed changes line-by-line, file-by-file, folder-by-folder
- Designed explicitly for teams who write code of *any* kind
- Resolves conflicts between different peoples' materials
- Facilitates discussion and planning about those digital materials

Who else uses GitHub?

As of 2021, GitHub had **69+ million accounts** from across the whole world and 200+ million repositories



How does GitHub work?

GitHub uses a **version control system** called *Git*.

Let's take a look!

Conceptual flow

Here is your main idea



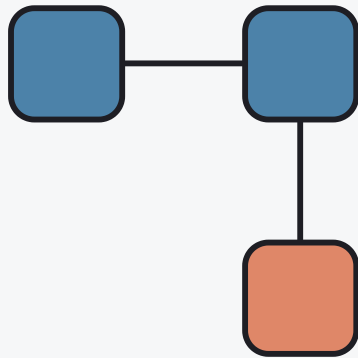
TIME →

Make a quick update to your main idea



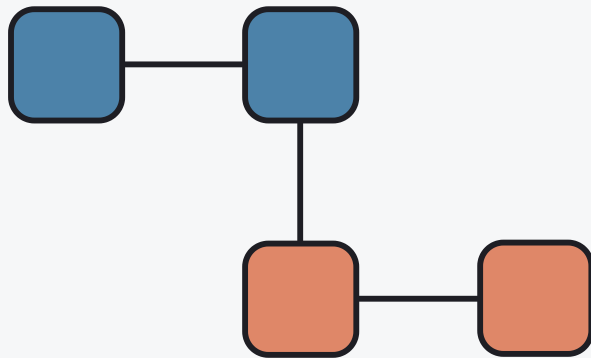
TIME →

Draft a new idea separate from your main idea



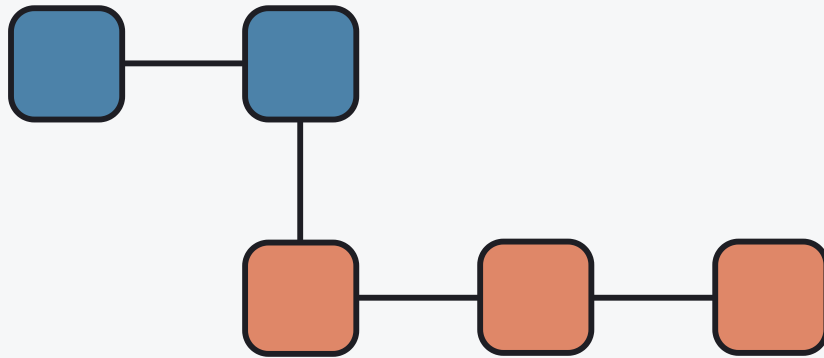
TIME →

Iterate on the draft of your new idea

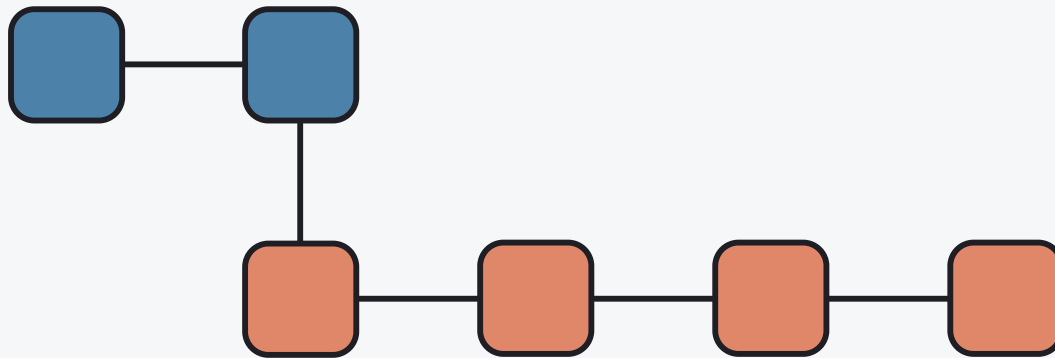


TIME →

Continue developing the new idea

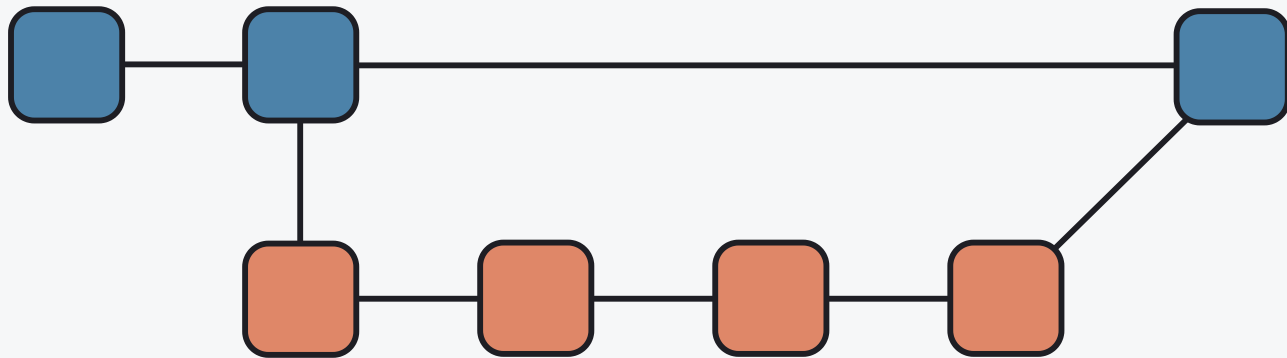


Make one more update to the new idea

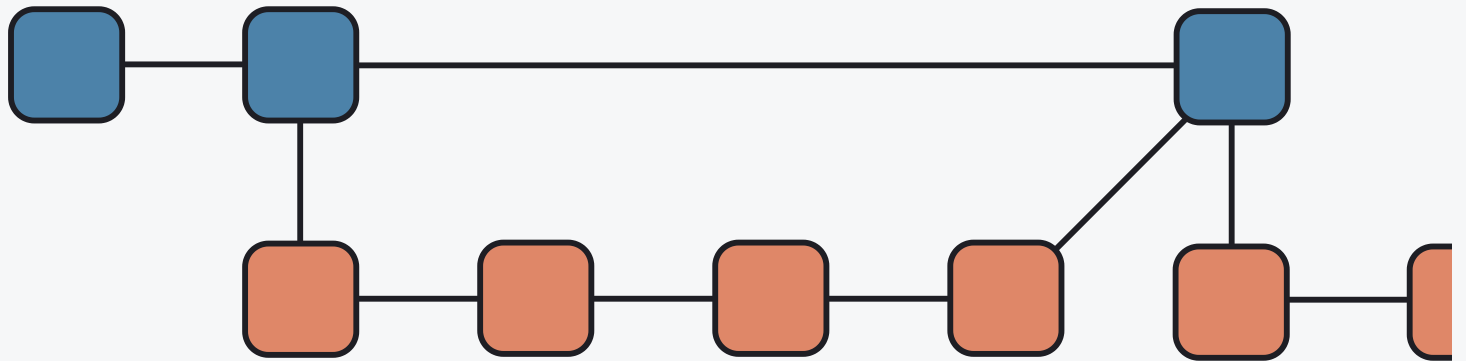


TIME →

Update your main idea with the new idea



Start a draft of another new idea



TIME →

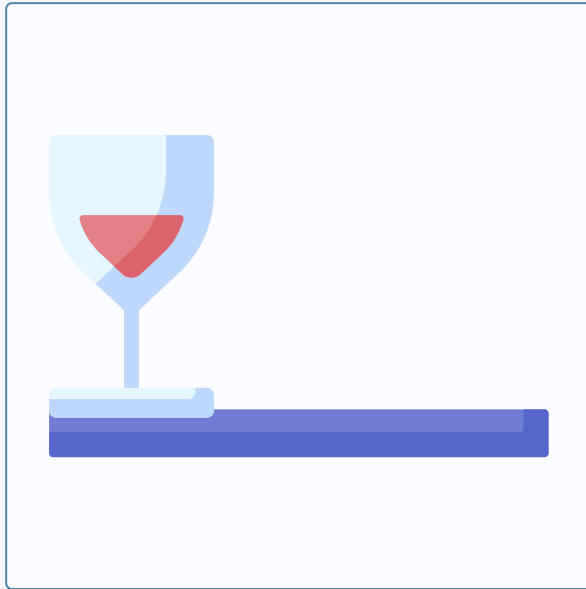
Meal-prep flow

Here is your wine glass



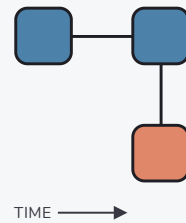
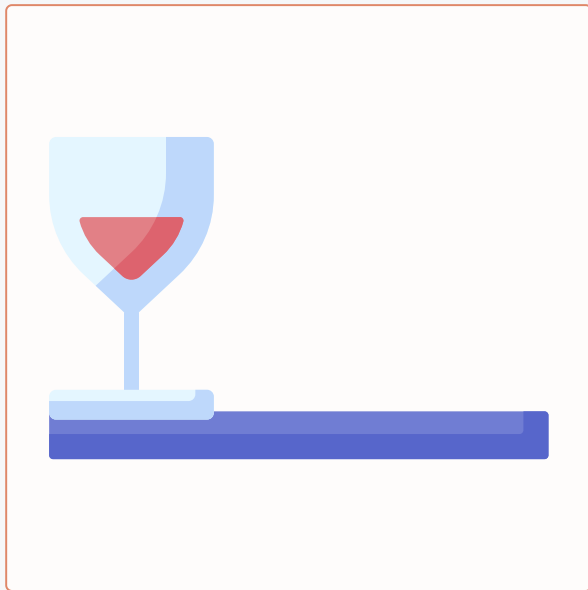
TIME →

Add wine to your wine glass

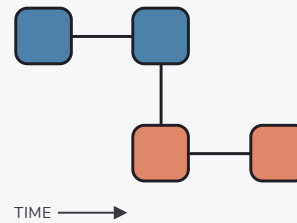
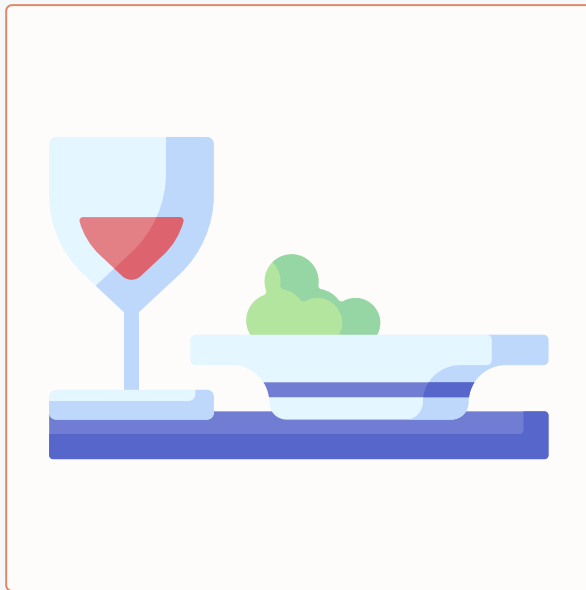


TIME →

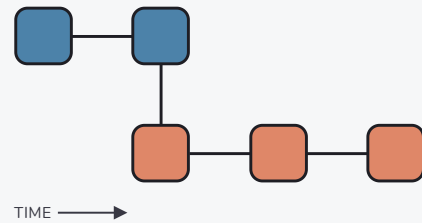
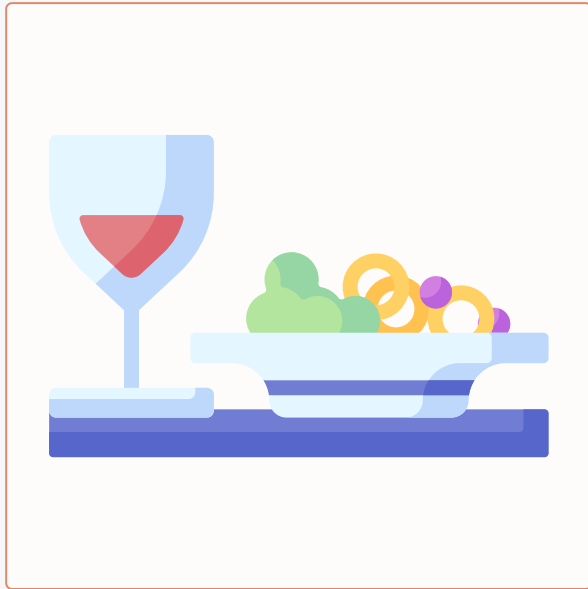
Leave wine aside to prepare your salad



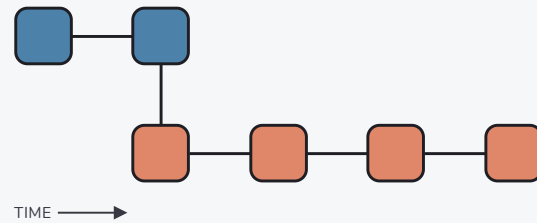
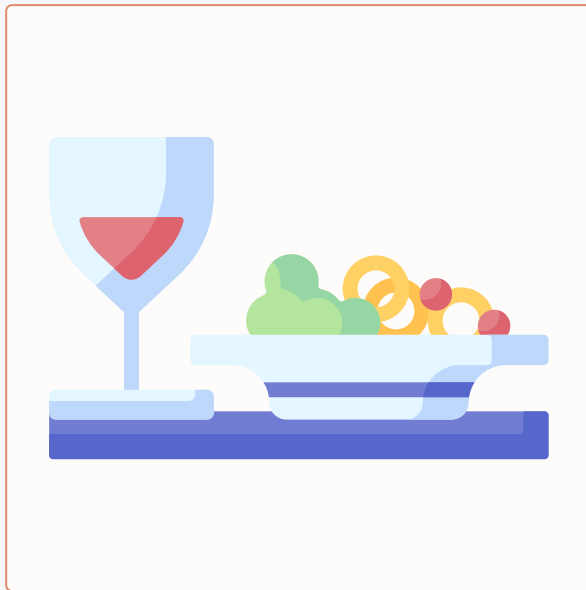
Add some greens to start your salad



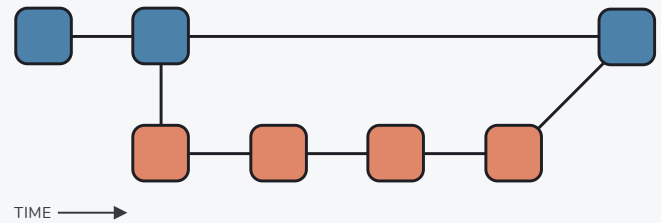
Add onions and grapes to your salad



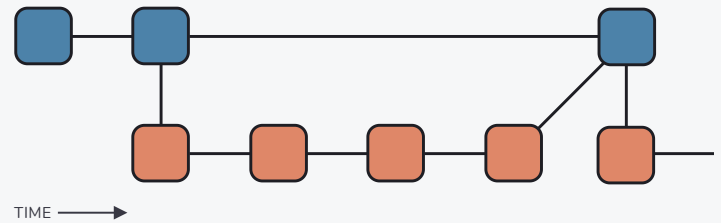
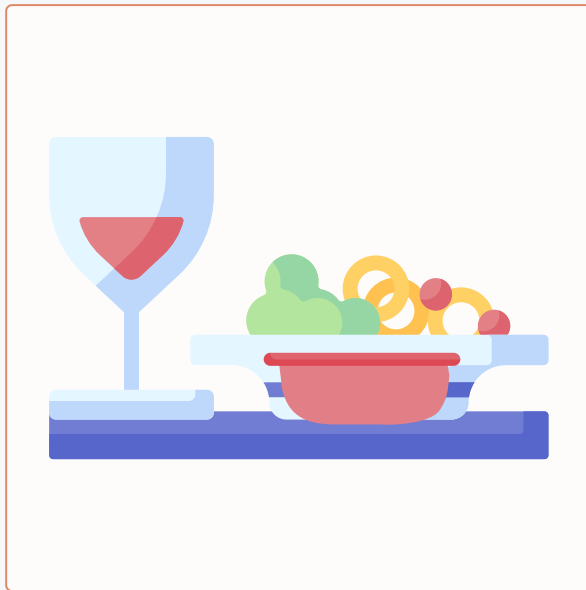
Replace the grapes with tomatoes



Bring together your salad and wine



Start prepping another part of your meal



Online survey flow

Here is a blank survey with a small title



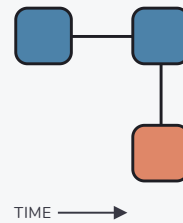
TIME →

Resize the title to increase readability

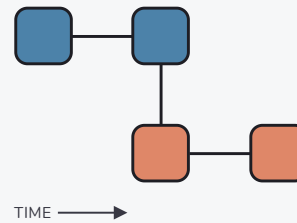


TIME →

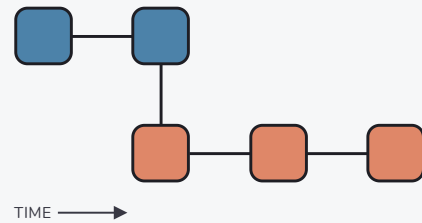
Draft the first set of questions separately



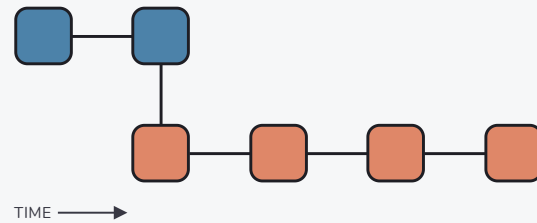
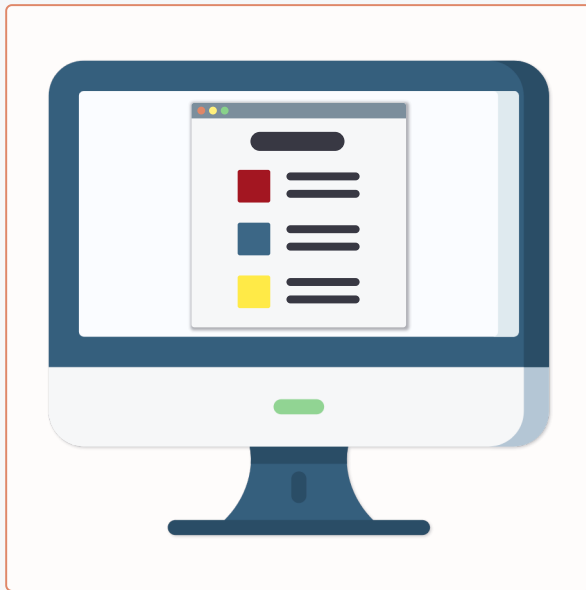
Add two questions to the survey draft



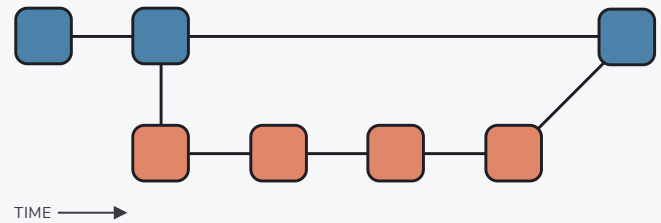
Add a third question to the survey draft



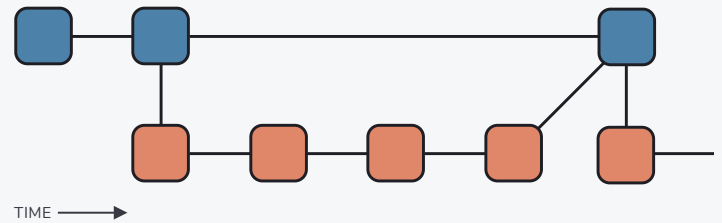
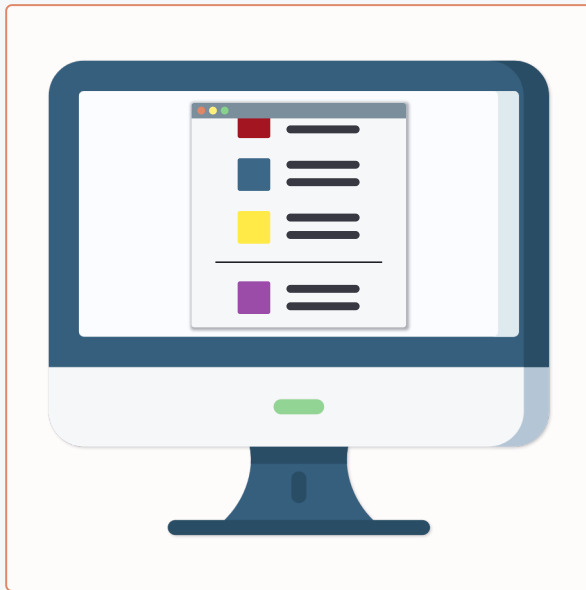
Replace the third question with a new version



Combine your questions with the title



Start drafting another section of the survey



Online survey flow with Git terms

The first survey version on the **main branch**



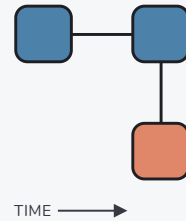
TIME →

Add, commit, and **push** very minor changes

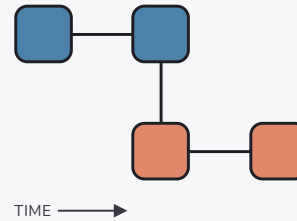


TIME →

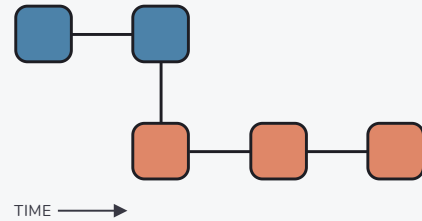
Checkout a draft branch to make major changes



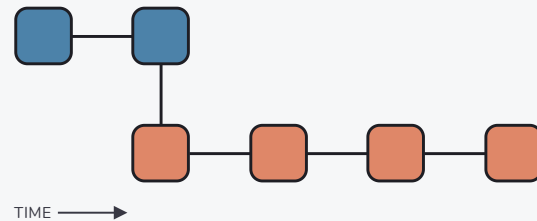
Add, commit, and **push** changes to draft branch



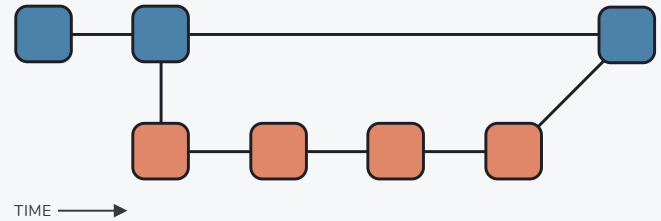
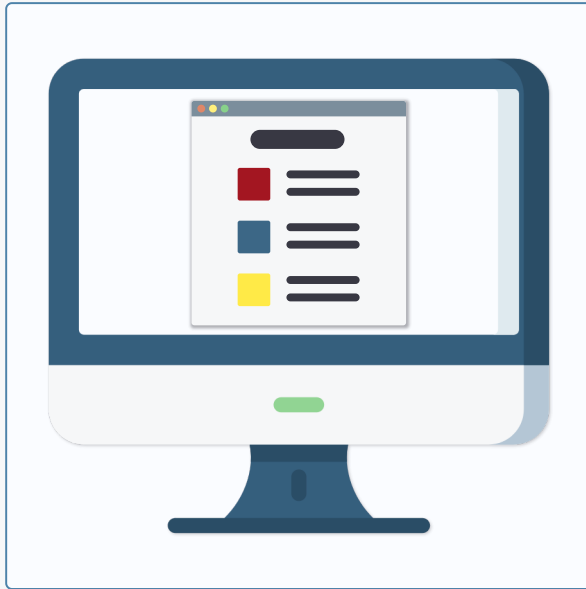
Add, commit, and **push** changes to draft branch



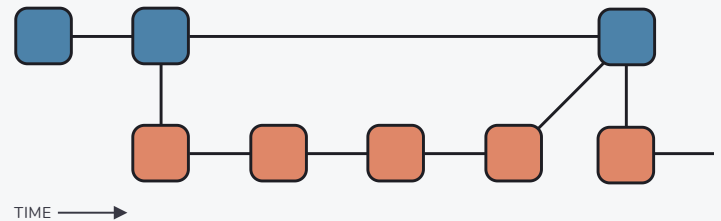
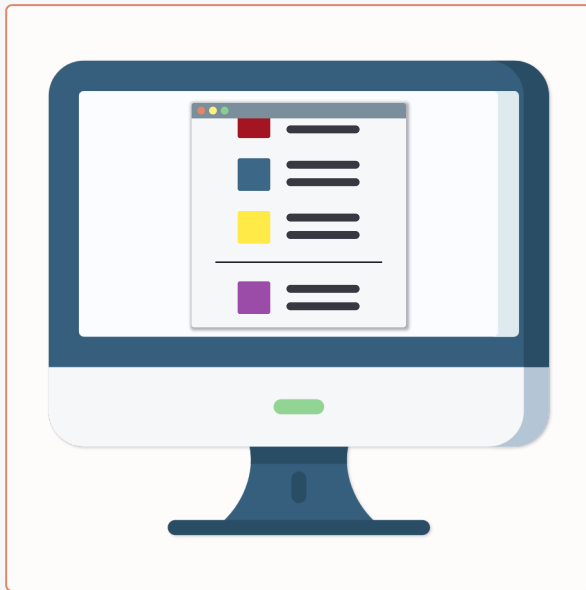
Add, commit, and push changes to draft branch



Merge your draft branch into your main branch



Checkout a new branch to make more changes





Again, how does GitHub work?

GitHub uses *Git* to help teams **develop** their ideas little by little, and documents *everything* thoughtfully.

Flow: Checkout > Add > Commit > Push > Merge

Tools help teams accomplish best practices



Slack

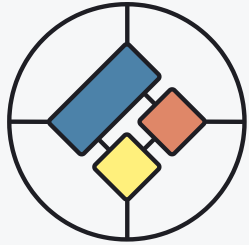


Google Calendar



GitHub

How do we leverage modern tools as
a lab? a department? a field?



start your lab

Learn how to setup and work with software tools that are designed to help teams collaborate efficiently and effectively on complex projects.

www.startyourlab.com

Acknowledgments

Active team

- Dr. Peter Sokol-Hessner, Assistant Professor, University of Denver

Industry advisors

- Austin Chustz, Full-Stack Software Engineer, [Fellow](#)
- Ayush Sood, Engineering Manager, [Facebook for Developers](#)
- Aaron Rios, Data Scientist, [Even](#)
- Ted Kornish, Head of Engineering, [TruthSet](#)

Thank you!

Icons made by [Freepik](https://www.flaticon.com) from www.flaticon.com

Slides created via the R package **xaringan**.