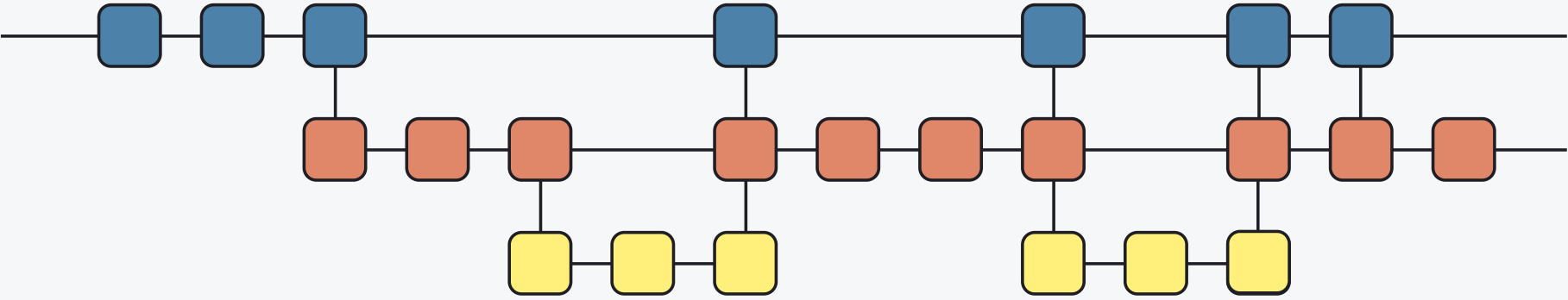
start your lab

Best practices for modern social science



Ari Dyckovsky

@adyckovsky

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

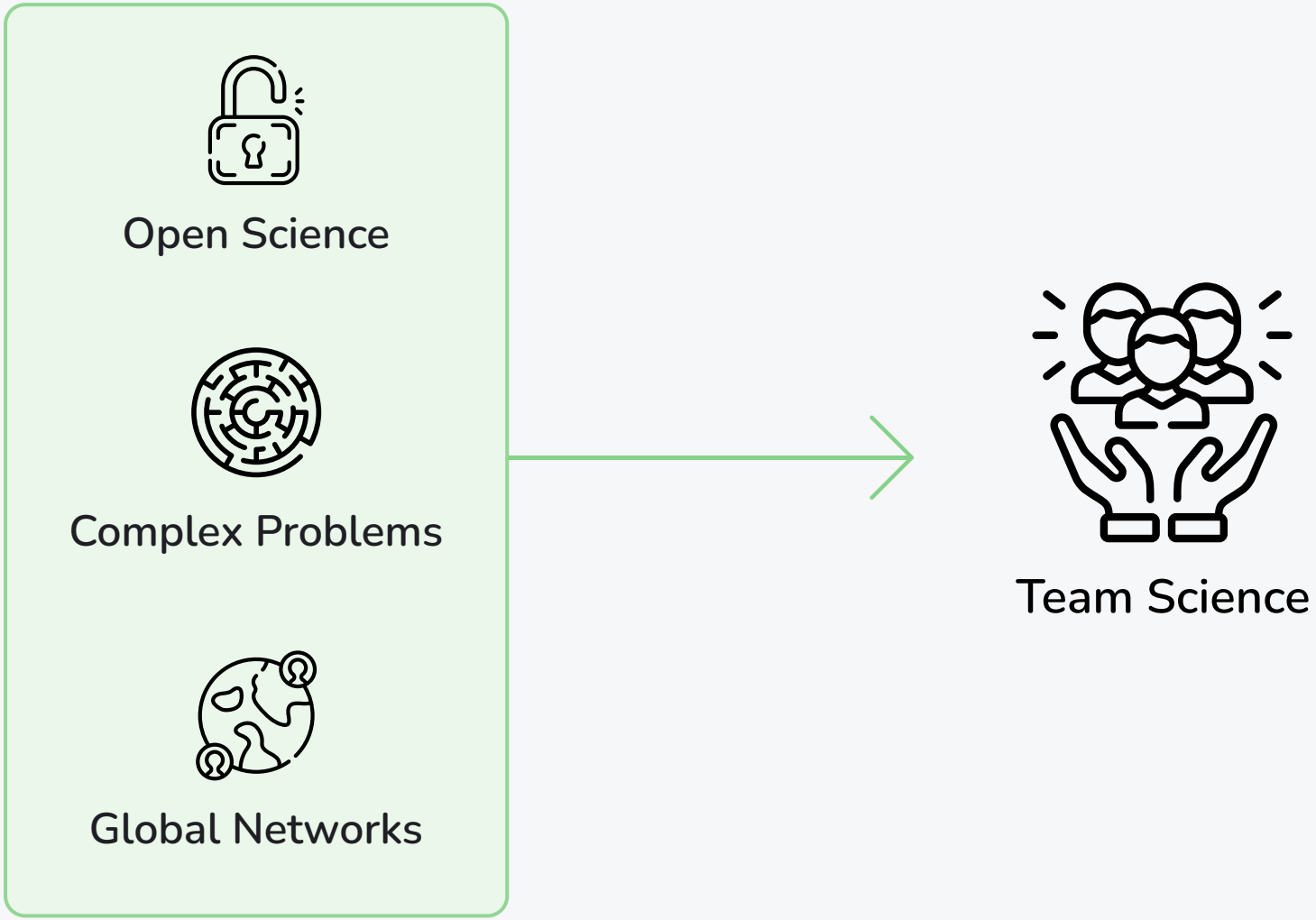
Modern social science looks like...

Open Science

Complex Problems

Global Networks

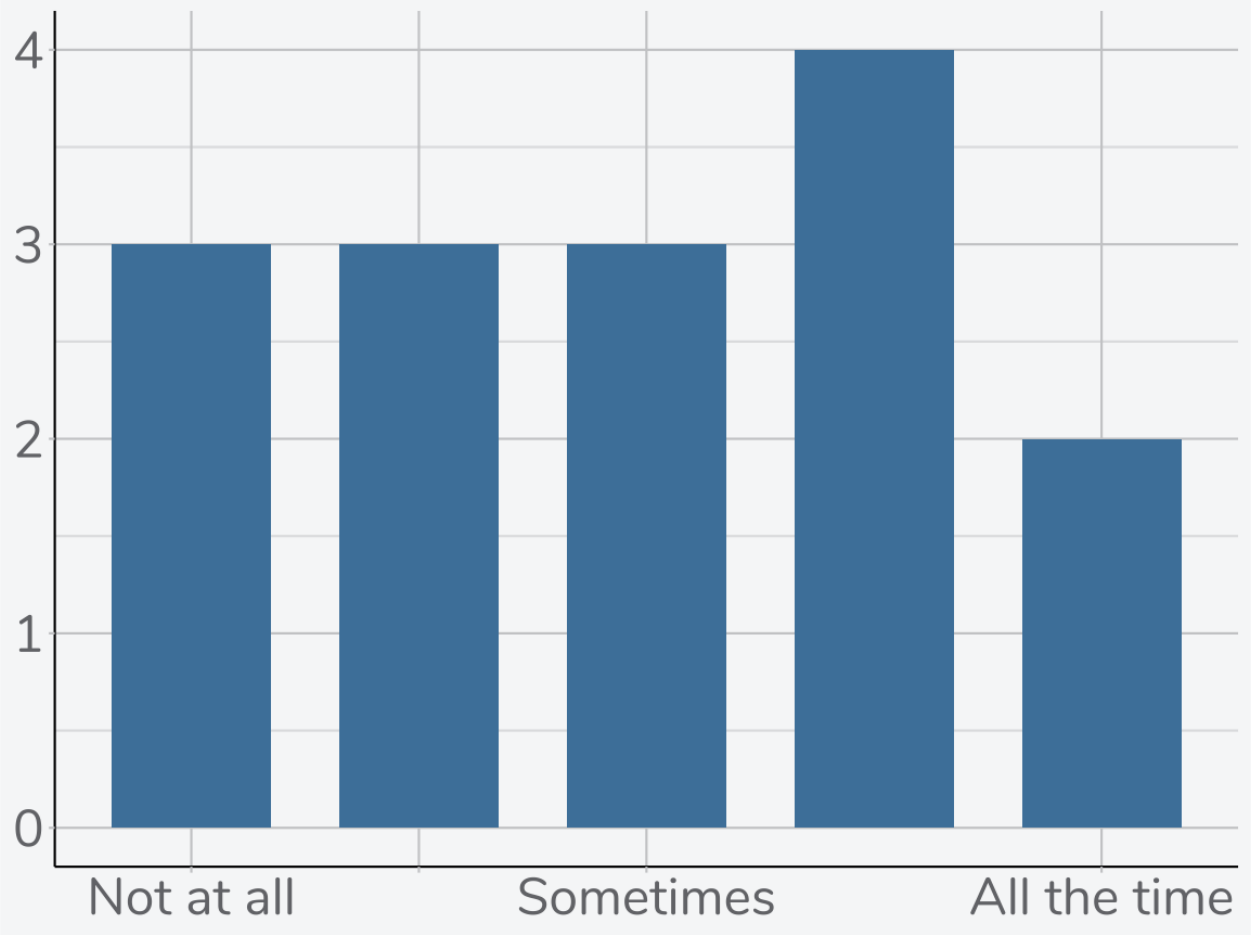
Modern social science looks like...



Why are we here today?

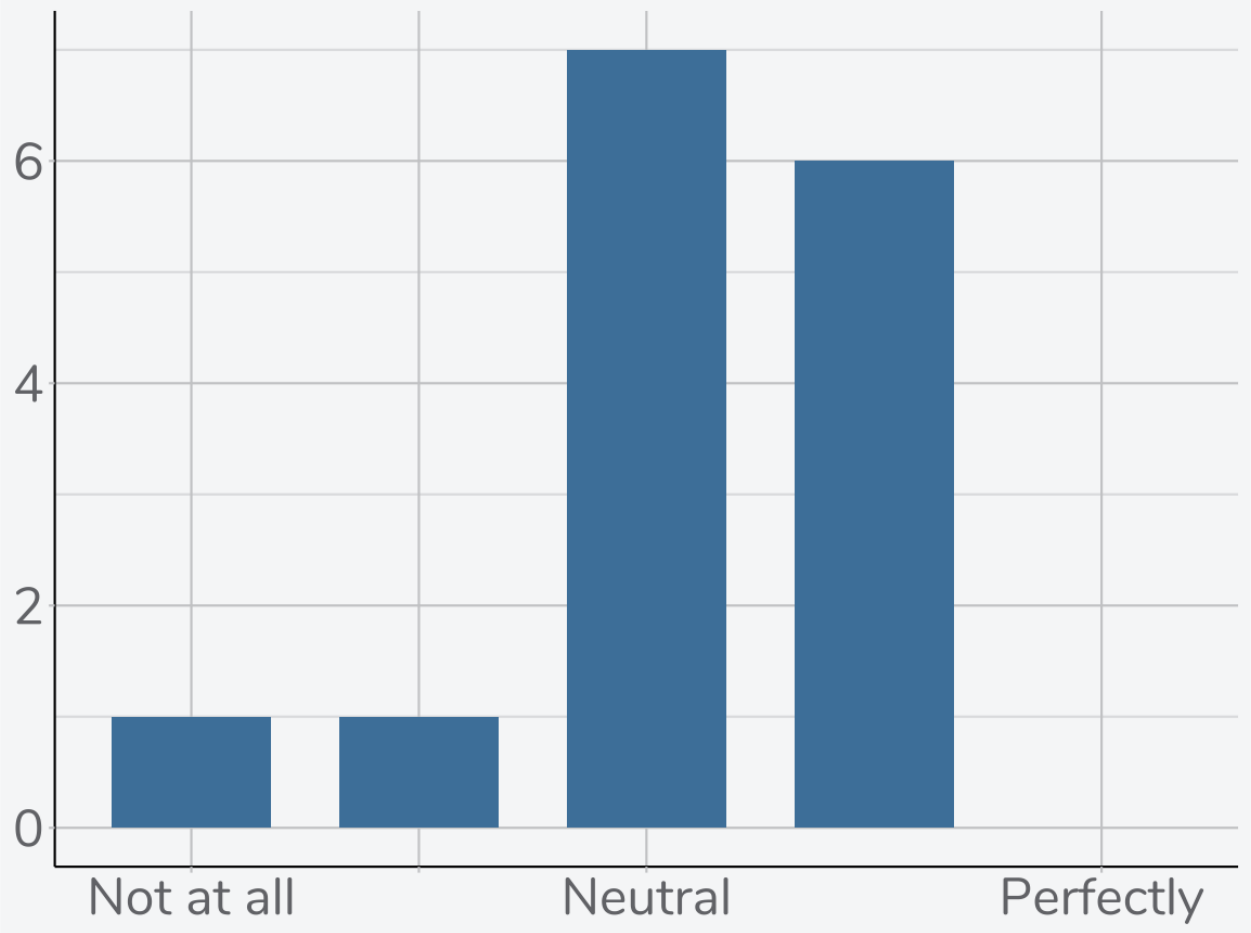
We can't keep track of different versions

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



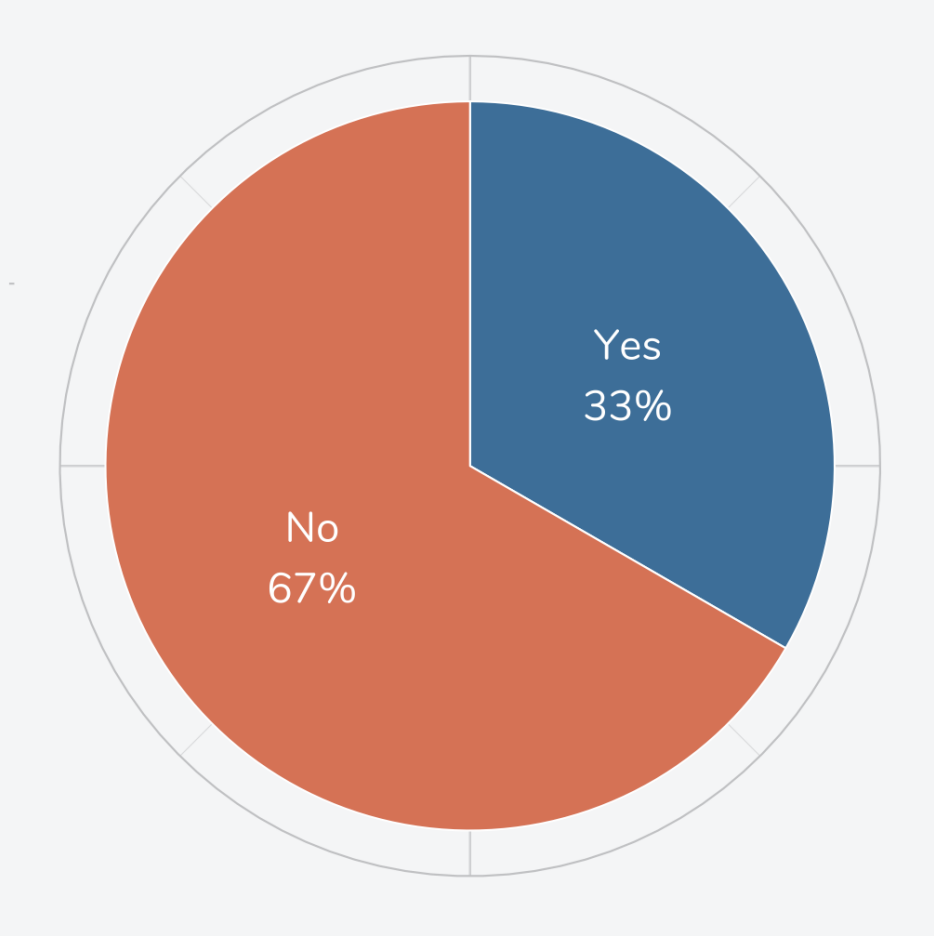
We can't find files confidently

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.

Examples of best practices

1. Decouple data from programs
2. Write programs for people, not for computers
3. Track changes using version control
4. Coordinate updates using an issue tracking tool
5. Don't repeat yourself (or others)
6. Automate repeat tasks

There are *many more* best practices.

See: https://www.startyourlab.com/community/resources

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*

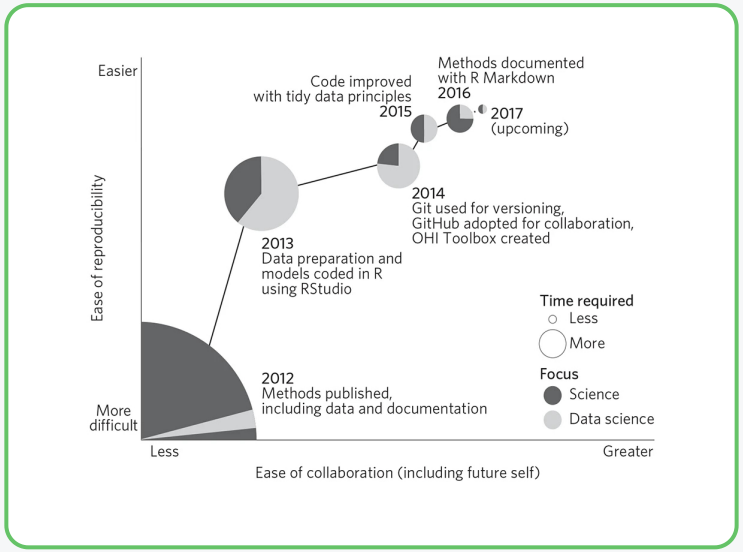
Wilson et al, 2014, Best practices for scientific computing, *PLoS Biology*

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

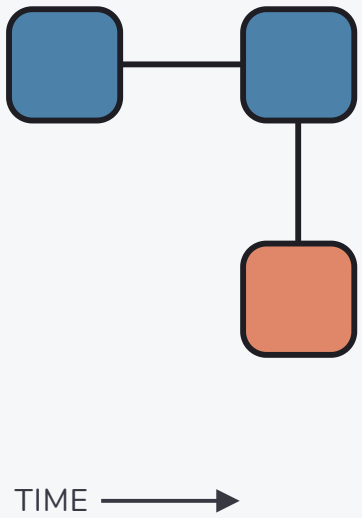
Here is your main idea

TIME

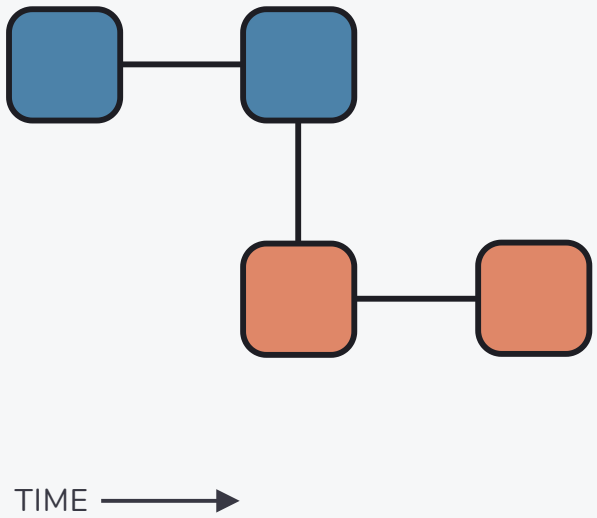
Make a quick update to your main idea

TIME

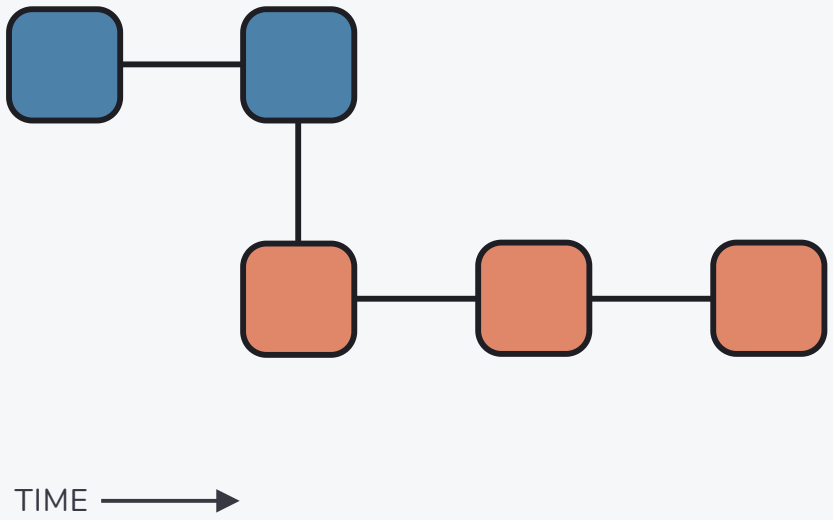
Draft a new idea separate from your main idea



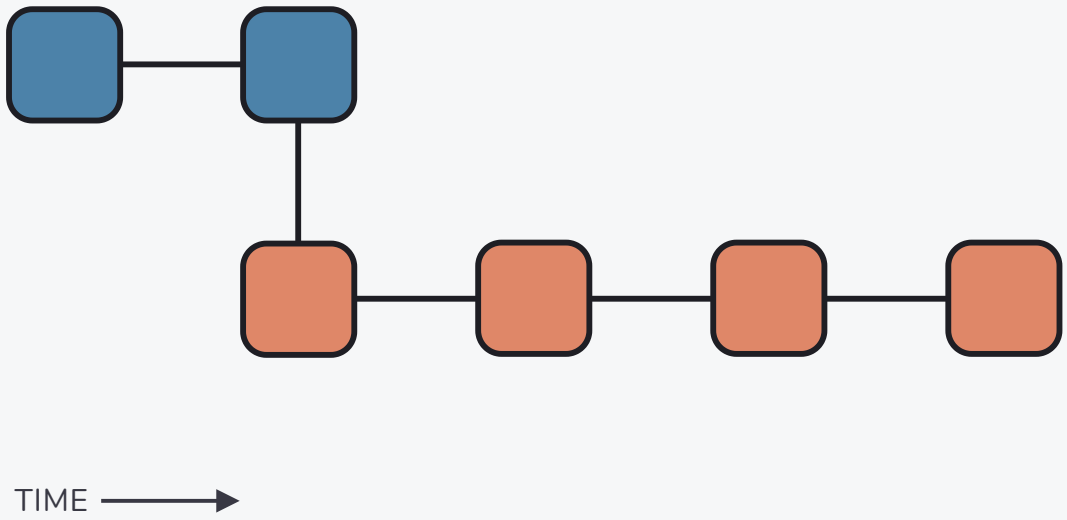
Iterate on the draft of your new idea



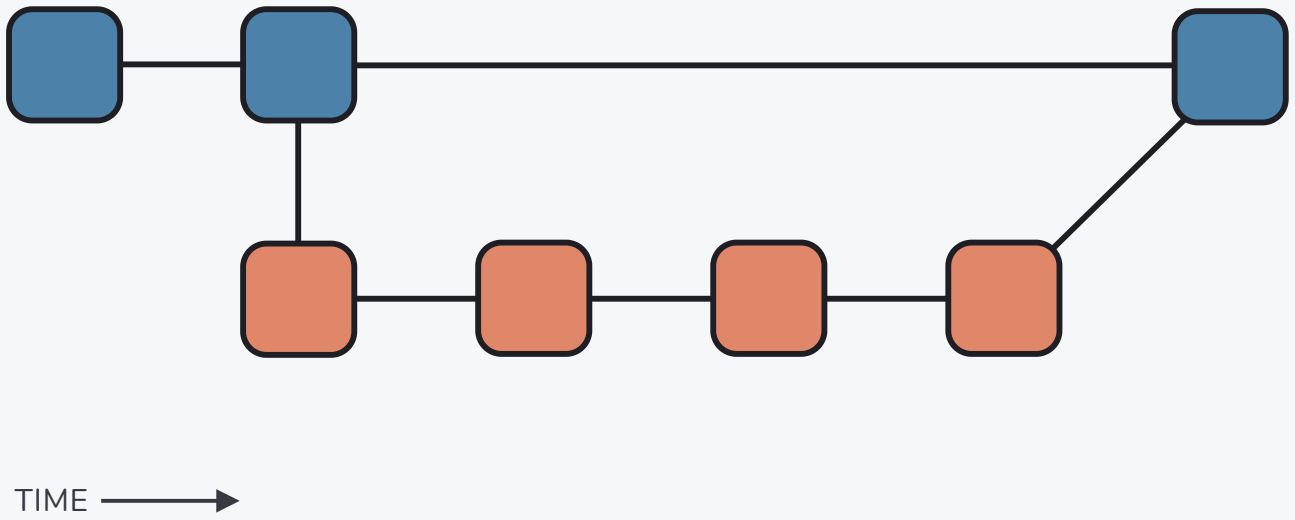
Continue developing the new idea



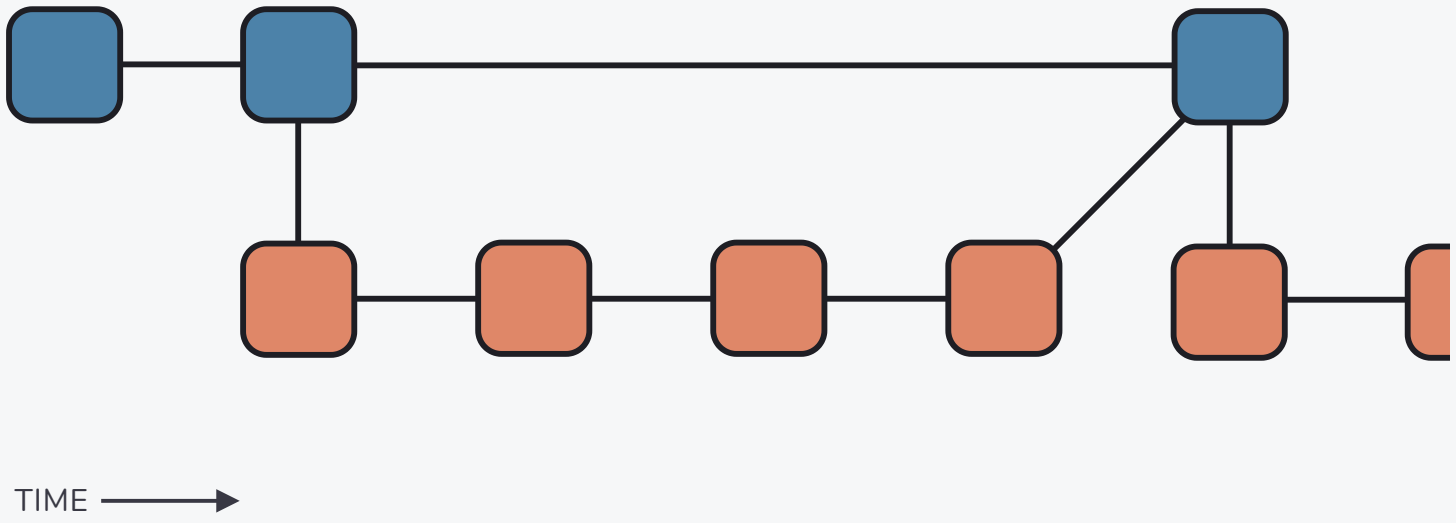
Make one more update to the new idea



Update your main idea with the new idea



Start a draft of another new idea



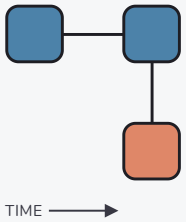
Meal-prep flow

Here is your wine glass

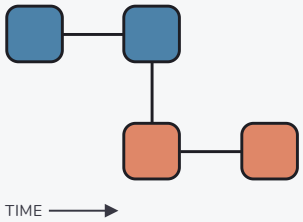
Add wine to your wine glass

TIME

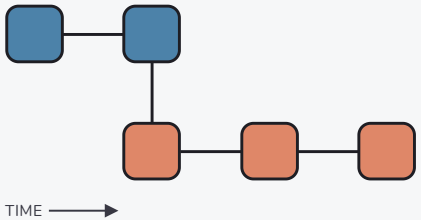
Leave wine aside to prepare your salad



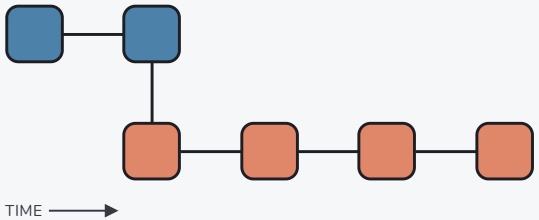
Add some greens to start your salad



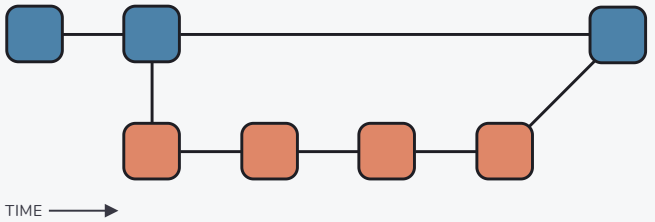
Add onions and grapes to your salad



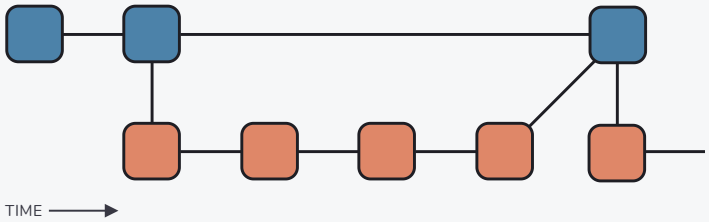
Replace the grapes with tomatoes



Bring together your salad and wine

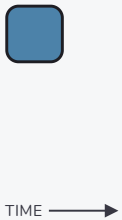


Start prepping another part of your meal



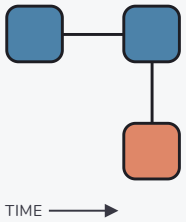
Online survey flow

Here is a blank survey with a small title

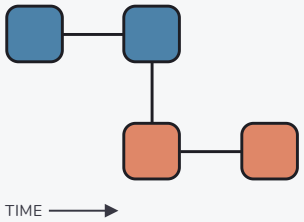


Resize the title to increase readability

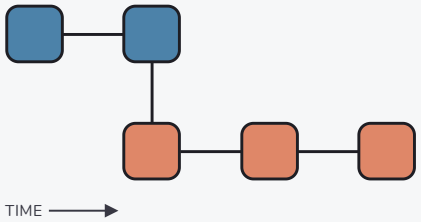
Draft the first set of questions separately



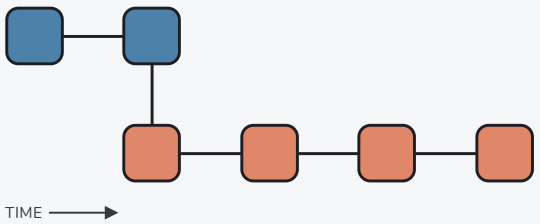
Add two questions to the survey draft



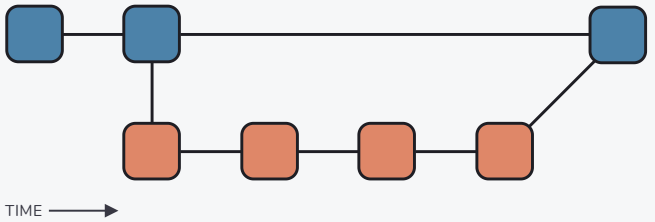
Add a third question to the survey draft



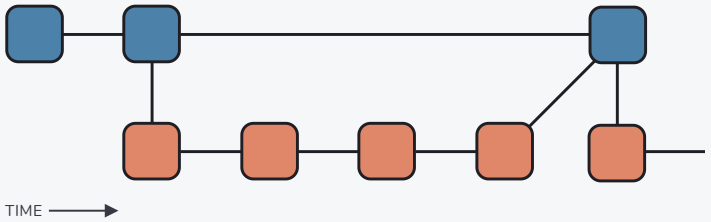
Replace the third question with a new version



Combine your questions with the title



Start drafting another section of the survey

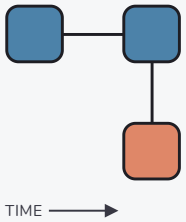


Online survey flow with Git terms

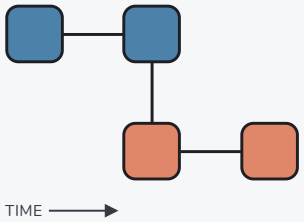
The first survey version on the **main branch**

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

Checkout a draft branch to make major changes



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



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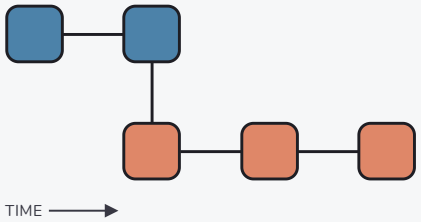
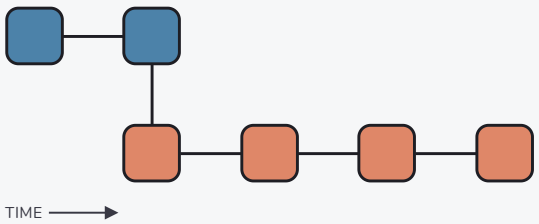
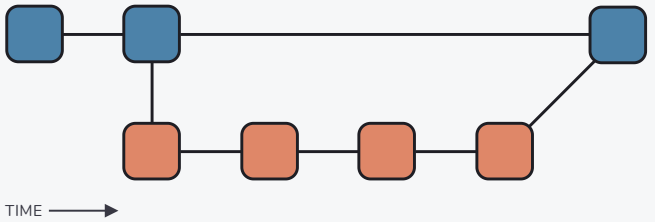


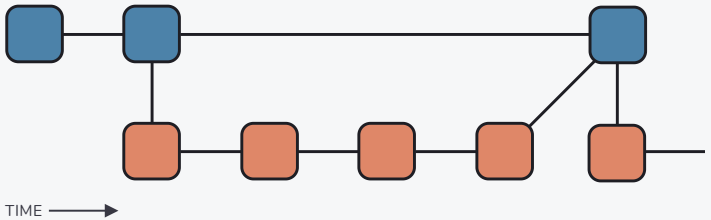
Add, **commit**, and **push** changes to draft branch



Merge your draft branch into your main branch



Checkout a new branch to make more changes

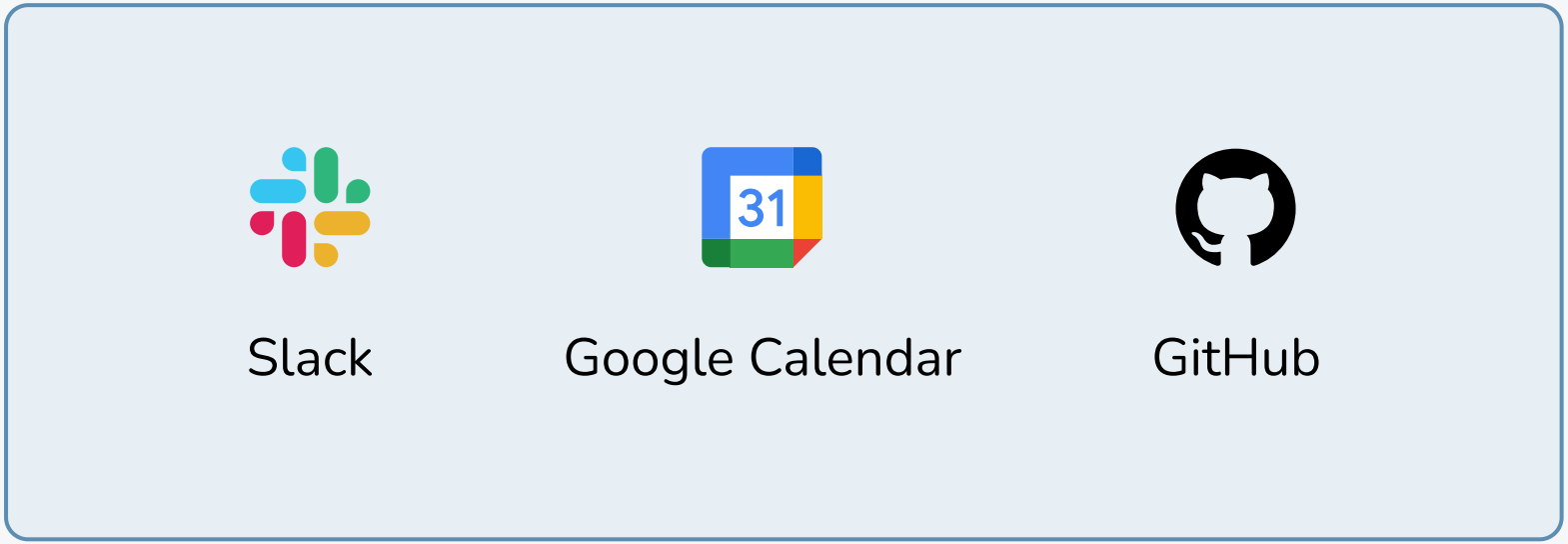


Again, how does GitHub work?

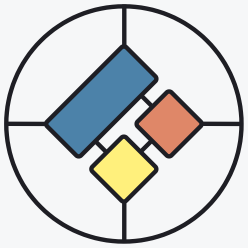
GitHub uses *Git* to help teams **develop** their ideas little by little, and documents *everything* thoughtfully.

Flow: Checkout > Add > Commit > Push > Merge

Tools help teams accomplish best practices



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



start your lab

start your lab

Open-source platform that teaches academic research labs how to get started with modern tools for modern science

Guides, tutorials, and templates focused on making team science more efficient, effective, and enjoyable

Let's take a look:

www.startyourlab.com

Next steps

1. Talk about best practices with your team
2. Plan! What are you going to do together?
3. Ask for support when you need or want it
4. Use Start Your Lab to facilitate your lab's tool adoption
    - In development! Have questions, feedback, suggestions? Let us know!

Final Messages

1. **This is about people.** Technology is the tool, but this is about learning and using conventions to help people work together more easily and effectively.

2. **It's never too late to learn to use these tools, at any level of usage**. You can get plenty out of this even if you don't do all the things.

3. **Yes, *we can* do this.**

Team 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

Questions?

Thank you!

- Icons made by Freepik from Flaticon
- Slides created via the R package `xaringan`
- Site hosted on GitHub Pages