The Allard Lab Manual

Jun

Dec 28, 2024

CONTENTS:

This is a continuing work in progress. The source file is on github at our allardlab repo. You are welcome to fork and pull-request improvements. There is also a compiled latex version.

CHAPTER

ONE

MISSION STATEMENT

1.1 Peer reviewing

Virtue: When we peer-review, we are constructive and we try to make their paper better.

For me (Jun), peer-reviewing is the scientist's version of a musician practicing scales. This is the action that makes me improve the most. It hones the skill of analyzing the technical approach, recognizing a gap, judging and improving rigor, and evaluating impact.

After a Nature editorial came out on the role of trainees in peer review, we adopt the "Bovyn rule": We always have a synchronous meeting to discuss the manuscript (not just asynchronous discussion).

- Varma, Peer Reviewing: Feeling like a real scientist eLife, 2024

1.2 The mission of our research group

The mission of our research group is to make *rigorous, relevant and elegant* contributions to the scientific knowledge of the world. We use computational, mathematical and biophysical approaches to figure out *how living cells use force, space and time* in their *problem-solving strategies*. We work so that the basic science discoveries we make become part of the *worldwide, multi-generational tapestry of scientific knowledge* that benefits all people.

It may sound rote, but every part of this 3-sentence paragraph has operational meaning.

- rigorous
- relevant: addresses a gaps in knowledge
- force, space and time: physics, mechanics, stat mech (entropy, diffusion)
- cellular problem solving strategies
- worldwide, multi-generational tapestry of scientific knowledge

1.3 Value-virtue pairs

To achieve our mission, we adopt certain principles, or "virtues". Every virtue comes from a value.

- **Value: We try to make other people's science better.**
  - Virtue: Peer Reviewing See this *Peer reviewing* section.
  - Virtue: We *memorialize* our own stuff, both for internal future use and possible external future use. See Dev Ops section
- **Value: We value time, the most scarce and precious resource.**
  - Virtue: Being on-time.
- **Value: We aspire for other people want to work with us.**
  - Virtue: Being a good listener, being excessively respectful of others. There are essential policies that have to do with respecting our colleagues, led by the wider scientific community, the UCI community, and our other affiliated communities. Besides meeting those standards, we try to go beyond them.
- Value: We think our projects are cool, in addition to valuable. - *[Jun Question for Team] Should we start posting fun visuals, etc., on social media: BlueSky LinkedIn, other?*.

CHAPTER

TWO

ELEMENTS OF A SCIENTIFIC CONTRIBUTION

2.1 Jun's paper writing tips and trick

2.1.1 How I write papers

0. Find some role-model papers, just to get inspiration for how to arrange figures, expose statements, organize subsections. Ideally the role-model paper is from a similar journal to the one we are targeting.
1. Outline the story: What are the Results headings and all the subfigures that tell this story? Sketch abstract.
2. Subfigures in Matlab .eps files
3. Assemble figures, write captions. Nice meaty captions: A good paper can be followed by reading captions alone (without reading Main Text).

Now relax. Lots of work ahead, but if you did 1-3 correctly, the rest is like a ball rolling down a hill.

4. Write Results text, Methods/Model text, Supplement. A good paper can be followed by reading Results text alone (without looking at figs).
5. Big literature review, spend a few days, re-read ~15 papers, search for anything we missed.
6. Write Discussion text. Connect to the field. Rank order paragraphs from most important to least important. Be upfront, but not apologetic, about limitations of work.
7. Write Intro text. The main purpose of Intro is to describe the gap in knowledge. Writing such a short overview of the field requires you to have an opinion of the field – mark of scientific maturity.
8. Assemble, polish. Clean up references. Give to lots of people for feedback. Get ideas for suggested referees.
9. Draft cover letter to the handling editor

- Omer's 4 key questions to answer in a cover letter: (1) How will this work make others think differently and move the field forward? (2) How does our work relate to current literature? (3) Who is the most relevant audience for the work? (4) What has the work accomplished and what has it not achieved?

Now relax. Measured in "wall clock" time, you might be halfway. The next step requires a stomach: *receiving peer review*.

2.1.2 Jun's Revision process

My workflow for resubmissions is as follows. It's kind of cumbersome but I find it works.

- I give every Reviewer comment a code, like "Rev1Minor3".
- I create THREE google docs in a folder here.
  - A Big Notes doc, with the Reviewer comments, todo lists / Action Items, paragraph drafts for the response letter, paragraph drafts for the new manuscript, and other notes.
  - A "Dashboard" doc, with very short summary of each comment, so we can check them off as we go – like a progress dashboard.
  - Another doc for the actual careful response letter. This is mostly blank for now, but then can be made quickly following cut-and-paste from Big Notes, and then edited carefully, especially for tone, which is easy to get wrong.

2.1.3 Writing tips

- *cut cut cut cut cut*
- One paper should have one main message. Repeat main message 5 times: In Title, Abstract, Intro, Results, Discussion. (In rare cases, 2 main messages.) All other messages go in Results and Discussion
- *cut cut cut cut cut*
- Writing a paper is a continuum of fact-reporting ("we did this", "we observed this") to interpretation ("this suggests that…", "this might have implications for…"). Caption is most factual, followed by Results text, followed by figure caption first sentence and Result headings. Discussion is most interpretation. For some historical reason, the figure caption's first sentence is the interpretation, while the subfigure sentences are factual.
- *Twelve scientist-endorsed tips to get over writer's block, Nature 2024 <https://www.nature.com/articles/d41586-024-02013-4>*
- Whitehead said, "By relieving the brain of all unnecessary work, a good notation sets it free to concentrate on more advanced problems, and in effect increases the mental power of [the reader]."
- Savage and Yeh "Novelist Cormac McCarthy's tips on how to write a great science paper, Nature 2019 I disagree with like half of these.
- *cut cut cut cut* part ii: "On the other hand", "It is important to note", … are usually meaningless clutter. (There are exceptions.)
- Verlyn Klinkenborg "Several Short Sentences About Writing"
- The Ten Best Sentences I've read about grant writing by Jun `Grant Writing sentences`.

2.2 Being an effective scientific communicator

We spend a lot of time on communication, optimizing presentations, poster, paper figures. This is for a few reasons.

1. Clear thinking means clear communicating, and clear communicating is clear thinking.
2. Science gains from network effects, but only if each lab/scientist devotes effort to communicating and coordinating. Like a high-performance computer devoting some of its cpu time to parallelization.

2.3 The elements

There is a standard layout – time-tested, powerful – for a scientific contribution that works particularly well.

- Big question/background
- Specific question/hypothesis – what you will deliver in this work
- "Here we"
- Method
- Results, which are usually active sentences, not plots or noun-phrases
- Impact

Here are some examples of paper abstracts and layouts:

- What paper elements? `Slides with examples of paper layouts`.

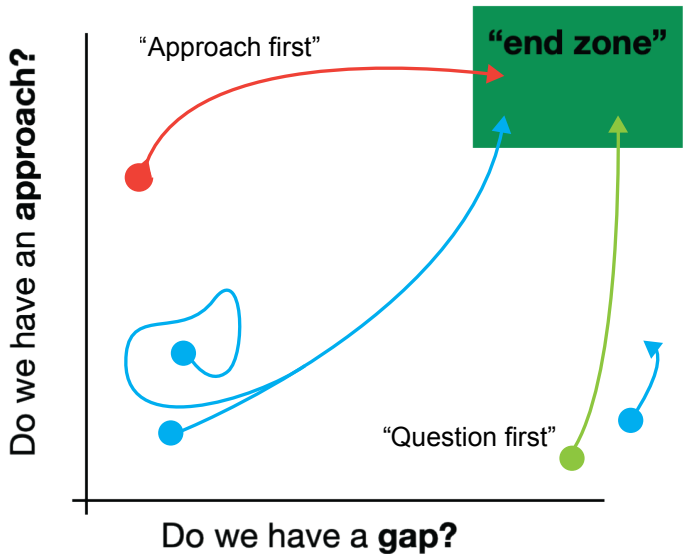
2.4 Approach and gap are of equal importance

"When I sit down with colleagues over a beer at a meeting, we don't go over the facts, we don't talk about what's known; we talk about what we'd like to figure out, about what needs to be done… This crucial element in science was being left out for the students." - Stuart Firestein (Columbia Neuroscience)

Doing science involves two activities of equal importance:

(1) Identifying the gap in current knowledge/needs

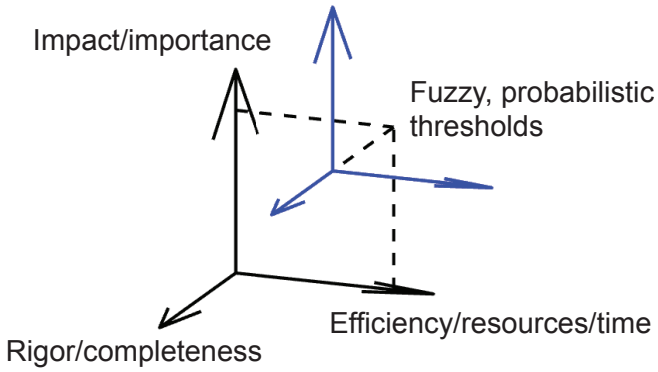
(2) Computational/modeling/experiment approach and carrying out that approach



It's ok to have one before you have the other (exploratory projects, "approach first" projects, "question first" projects,…) and it almost always happens that the approach and gap change throughout a project.

2.5 The importance+rigor+time trade-off

A useful coordinate system to "project" (verb) success as a project progresses:



(1) Importance/impact of the result: This importance criteria is often the easiest to retreat on, because there is an attitude in the scientific community that scientists are bad at predicting future importance anyway.

(2) Rigor/completeness/quality. How much did we explore all the "nooks and crannies", eg parameter sweeps? How much did we reject alternative possibilities? How much did we test the tools? Also in this category is the quality of presentation. How clear do the figures, text, code repositories, tables, communicate the result?

(3) Efficiency/use of resources/speed: Are we going to get this paper done in time, so people can move on to even bigger and brighter things!

There is a fuzzy, probabilistic minimal threshold for each of these.

Above the threshold, there is a trade-off between them. Teams benefit from discussing this trade-off.

Don't underestimate the value of speed.

2.6 Jun's definition of baseline scientific rigor

Working in multidisciplinary teams has taught me that **rigor isn't a rigid threshold—it's a flexible, context-dependent standard** that adapts to the nature of the question, the tools available, and the intended audience.

So, I have adopted this definition: baseline rigor means **accurate, transparent reporting of what was done, what was not done, and what remains uncertain.** Think of it like a **battlefield journalist in a conflict zone** rather than a battlefield general: A journalist's job is not to win or advance the troops but to report faithfully on its unfolding realities—regardless of whether the war is ongoing, paused, or complete. Similarly, a scientific paper is a snapshot of a project in time: a rigorous paper doesn't need every question answered or every experiment performed, but it must report an accurate, clear story about the current state of understanding. Speculation is ok, wishful thinking is ok, as long as it is labeled as such.

The *science* does not need to be complete, but the *report* needs to be complete.

Using this definition for baseline rigor, this immediately implies a relationship with importance of the result, since by this definition alone, we would publish unimportant/boring/trivial results. So rigor can be paired with, but separated from, the concept of **importance.** Baseline rigor ensures a scientific report is trustworthy, but importance ensures it's worth sharing in the first place. A perfectly rigorous but trivial observation adds little to the broader scientific tapestry. Therefore, we aim to meet baseline rigor as a non-negotiable standard *while actively engaging with the question of importance.* This interplay creates a healthy tension: we strive to report honestly, avoid unnecessary scope creep, and

ensure that what we publish contributes meaningfully to advancing knowledge. Balancing these two dimensions is the art—and the joy—of scientific work.

That is, rigor primarily lives in how we report and contextualize our work, not in reaching some mythical state of experimental completeness. This perspective frees us to tackle ambitious, cross-disciplinary questions while maintaining high standards. When we're uncertain about a result or interpretation, we don't need to do "just one more experiment" – instead, we can rigorously describe our current understanding and its boundaries. This approach helps prevent the common trap of endless perfectionism while ensuring our work contributes reliably to the scientific record.

2.7 A pipeline process requiring different skills and mindsets

Scientific research projects are a pipeline process with many steps. Each step in the process requires a different skillset and a different mindset. (Not "smart", "hardworking", "fast", which are useful at all steps.)

- Early, exploratory phase. Skillset and mindset: Ability to accept uncertainty. Curiosity. Ok with lack of rigor. Willingness to try messy, vague things. Let's just see what happens! "Intentionality" is bad here. A love of learning. Being comfortable with lots of failure.
- Rigor phase, "benchwork" phase. Skillset and mindset: Technical rigor. Carefulness. Being well-tempered. At some point here, there must be a transition from "what is the most interesting conclusion" to "how would we show that conclusion?".
- Production phase. Intentionality. Being focused on a single goal, which is to get this thing out the door. Willingness to put aside ideals of ambition. Willingness to put aside ideals of comprehensiveness. Perfectionism is the enemy.
- Write-up phase and review phase. Skillset and mindset: (1) Empathy, humility. Put yourself in someone else's shoes (the peer reviewer, the field, the collaborators,...). To be a "stranger in a familiar land". Ability to listen to others, and hear both their logical argument and what they aren't saying. (2) Since the goal is communication rather than impact, some tradeoffs swap completely. Perfectionism in presentation and clarity, at the expense of perfectionism in eg comprehensiveness and completeness. The *science* does not need to be complete, but the *report* needs to be complete.

Pipeline steps are "multiplicative" rather than "additive", meaning that you cannot make up for a deficit in one with being a superstar in another. In a way, the fact that they're multiplicative is anxiety-inducing, because you must be good at everything. But in another way, it is liberating: You don't need to be the smartest, the most careful, the hardest working. (Indeed often, you will see people that seem 10x smarter than you, and they can't get anything done.)

2.8 Figures!

- What makes a great figure? `Slides about figures`.

Upshot: You need the ability to make a figure that is publication grade, informative, and digestible. *Not a pixel out of place.*

The "Masterful Inaction" principle: it's ok to make a quick rough figure, as long as you're doing it because you have the ability to make a publication-quality figure and have deliberately made the decision not to.

For size rules, check out guidelines for some or our favorite journals: PLoS, PNAS, Biophys J, Nature, EMBO. Roughly, the figures are either 19cm or 8.5cm wide, tall enough to fit on a single 8.5"-11" page with their beefy caption, and fonts must be larger than 6pt.

2.9 The under-rated power of writing

The paper - meaning a 4-10 page document, written in full sentences, describing a gap in knowledge, a method, a result, and its impact - is a highly-rated and yet still under-rated mode of communication. Nothing compares.

- Start the latex doc early! Prototype latex doc that Jun uses personally in this git repo. (This is good for Project Seeds, and papers. Probably not good for thesis.)
- A lot of writing will get thrown away as the project evolves. **Writing is never wasted, because clear writing is clear thinking.**
- "When people present an idea in slides, everyone says 'yaaa that's greaaaat'. But when you make them write it down in a 1-page proposal, suddenly the problems become clear, and the needed improvement becomes clear." - Qing Nie, paraphrased by Jun. In many cases in our projects, we have a fantastic presentation (poster or slide deck) about a year before we have a great paper.
- "The reason writing a good 4 page memo is harder than 'writing' a 20 page powerpoint is because the narrative structure of a good memo forces better thought and better understanding of what's more important than what, and how things are related."" Jeff Bezos, quoted in "Write documentation first, then build". Similar point made by economist and philanthropist Tyler Cowan in "Against slide decks" (I'm not against slide decks though.)

The *paper writing process*

2.10 External resources

- Figure design tips from software user interface designer
- Creativity as an antidote to research becoming too predictable, Baer et al., EMBO J 2023
- "How to slay zombie research projects and move on" Nature 2023
- A debate about the importance of communicating your science in Nature 2024
- "The code review anxiety workbook". The first part is a cognitive behavioral therapy-style actionable advice. The second part is mostly about polite e-mail writing.
- The `Oxford Biomedical Sciences PhD ("DPhil") proposal guidelines`. Especially intruiging is how "specific measurable attainable relevant and time-bound" it emphasizes, compared to open-ended exploration.

2.11 Getting to scientific quality / rigor

Overflowing work hours (all-nighters etc) are avoidable. It often feels like there is a crisis, and there is a sudden need to push to make it. This phenomenon is sometimes called "heroics"[1] . The way to avoid heroics begins 10 weeks before a deadline (conference poster or talk, advancement exam, grant submission, paper submission). .. After that, the ball is rolling down a slope.

The time it takes for each step get shorter with (1) experience and (2) trust with the collaborators and with me.

Note many steps involve feedback to previous steps (e.g., in oral part you often realize you need a figure modification). .. So, in true *DevOps* philosophy, you should plan to revisit every step. .. We have a rigorous imposed timeline when getting ready to present a result to the outside world. .. The time it takes for each step get shorter with experience and trust with the collaborators and with me. In general during a science project, I try to serve as an advisor rather than

[1] Some organizations believe that "heroics" are bad: they show the system failed. Then again, they are also a sign of optimism, aspiration: Many creators say they wouldn't have been able to achieve greatness if they knew how hard it would be when they started. Sometimes there is an opportunity you want to pursue, but we don't have 10 weeks. The important thing is that you know what you're getting into.

a gatekeeper, but in terms of communicating and exposing it to the world, here I invoke my prerogative to be more controlling, at least at first.

- 9: Outline of **narrative**, i.e., "key sentences" "headlines"; Wishlist of figure and key sentences. Statement of gap that is being filled; wishlist of figures etc that address it.
- 8: Draft figures with preliminary computation/data and key sentences. This is the **proof-of-concept** point.
- 7: Draft figures with publication-grade computation/data and key sentences. Figures are understandable, rigorous. This is the **result-production cutoff** date.
- 6: Abstract draft. Decision about whether to submit to the conference. Jun approves draft. Ok to make commitments, e.g., submit an abstract to BPS/ASCB/SIAM, to begin convening Committee for Advancement, …
- 5: **Presentation-grade figures**
- 3&4: Complete (begin to end) **slide/poster first draft**. Draft of intro, background, lit review. (For posters, Jun requests that paragraphs copied in a separate document e.g., Google doc, for easier editing.) Plan for around 1x-2x rounds of back-and-forth with Jun, from the time of this first complete draft.
- 3&4: Presentation **run-through with Jun**. No time-trial. See if everything hangs together. For talks: what slides are needed, how should they be designed? For posters: What's the layout?
- 2: **Oral practice with audience** e.g. Allard Lab. Time trial.
- 1: Final time-trial practice 1-on-1. For posters, final version to printer. Focus on oral (spoken words); when you're done the slides, you're half done, because the spoken words are half the experience.

It's a slog. Cycling through these steps get faster, and more independent. But the steps never go away. People embarking on their first forays into research take about 1 week per step. ("Are you kidding me, 9 weeks to make a damned poster/talk?!") A question for you to be always asking yourself: How do you get faster and more independent, as you mature scientifically? When going through this for the first time, I insist on a number of weeks for each step. As you become more experience and I get over my trust issues, the steps accelerate –in some cases a lot! (this acceleration is an honor for me to watch, and one of the single biggest joys in my professional life) – but they sorta never go away.

The above rough guideline of *ten weeks to a presentation* is related to the rough guideline of *ten weeks to a paper*.

CHAPTER

THREE

CODERS AT WORK

3.1 Memorialization and the DevOps strategy

- What is "DevOps"? `DevOps keynote slides`.

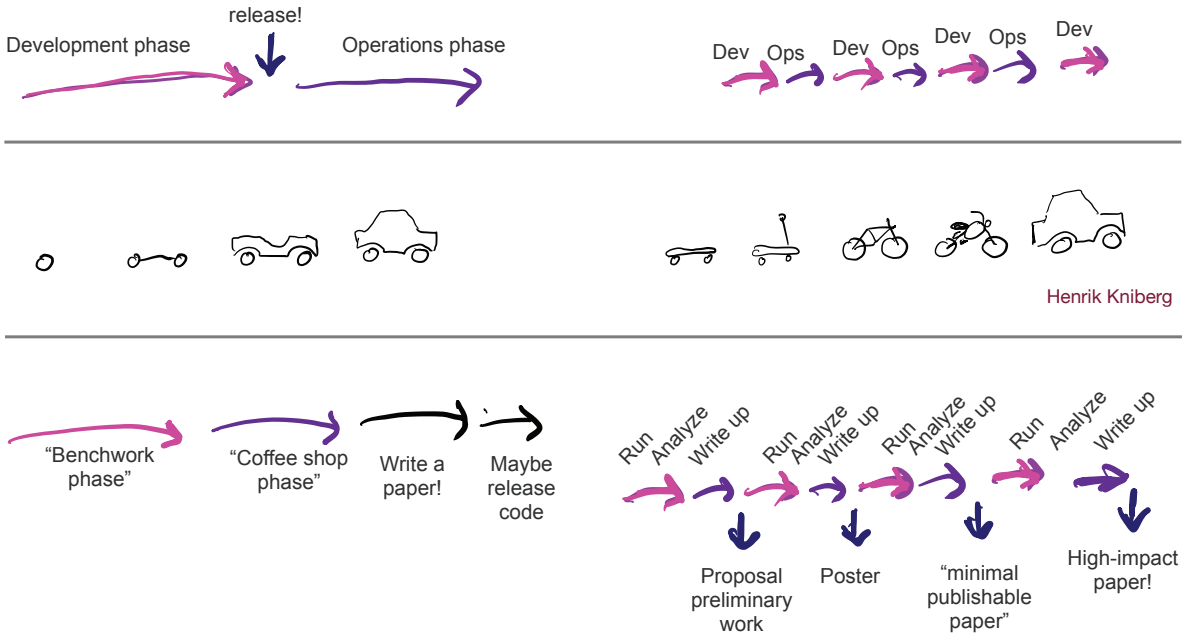
3.2 Upshot

In order to…

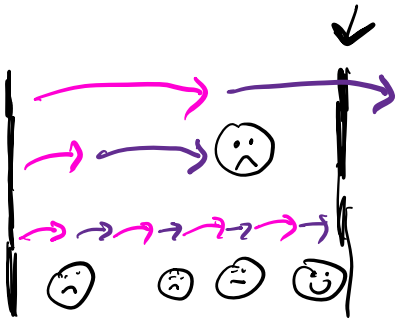
- …make our contributions make other people's science better (within our group, and other labs)
- …keep our own peace of mind!
- …foster healthy, fun and productive collaborations
- …maximize our own efficiency

version-control can be used smoothly for entire projects (analysis and write-ups, not just code).

This allows you to use a small-batch, beginning-to-end, continuous-improvement "DevOps" approach (also known as "first, build a bike"). This approach has pros and cons.

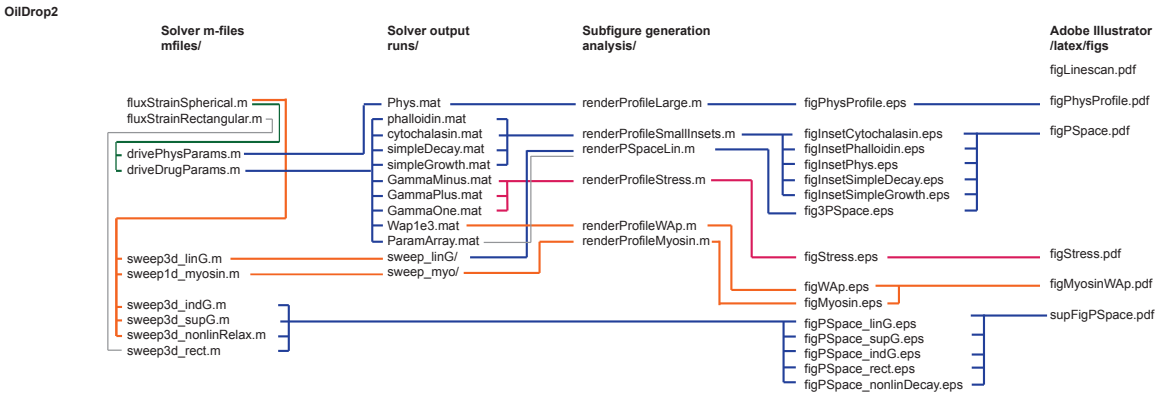


The biggest pro is that you have the option of hitting a deadline "Promise to ship, but don't promise the result" (to quote Seth Godin in the book "Shipping Creative Work").



3.3 Internal resources for coder performance

- A project workflow file with functions, scripts, input and output. The program VSCode with draw.io plugin is excellent for this. "Diagrams are a great way to communicate ideas visually and can be used to extend or sometimes even replace textual documentations of software projects.", Draw.io VS Code Integration.
  - Project `workflow` from Lewis et al 2014
  - Project `workflow` from Clemens et al 2021



- Start the latex doc early! Prototype latex doc that Jun uses personally in this git repo. (This is good for Project Seeds, and papers. Probably not good for thesis.)
- Example from the physics-based cell biology stochastic simulator ReaDDY of their "source tree" and code repo organization

3.4 When to go full-on DevOps, and when not to?

These tools, like the project workflow schematic, are sometimes useful but sometimes overkill. It is important to have the ability to use these tools, but then it is ok to decide not to use them.

- Wilson et al, "Good enough practices for scientific computing" PLoS Comp 2017

Here are some rough guideline

- **Even for the simplest code:**
  - Thoughtful variable names with consistent style (`camelCase`, `snake_style`, etc)
  - Comment at the top that says what the script tries to achieve
- **When you have a presentable figure**
  - git and version control
  - Design a single source of truth, within a scripts. i.e., design so you don't need to type in the same information twice, unless there is a test that shows an error if they mismatch.
- **Past the Norris limit of around 1500 lines**
  - The Norris limit is rough amount of code an untrained programmer can write before the code becomes so tangled that the author cannot debug or modify it without herculean effort.
  - Dedicated `/doc` directory
  - Thoughtful tree (i.e., folder and subfolder) structure. There are entire articles written on whether to put source in a `/src` directory.
  - Roughly 20% of time "refactoring" (improving the code even if it's working fine as is). An expression from software engineering is "technical debt", the amount of disorganized clutter that slows future progress. How much time should you spend paying down technical debt (re-organizing your notes and directory structure, taking notes) versus producing results? This is called "refactoring". We debated this percent a lot and this is the range that emerged.
- **Once the first draft project outline has crystalized (you know the question/gap and approach, and know the figures to generate). This can be one hour a day, one day a week, or one week per month.**

  - Design a single source of truth, within the workflow.
  - `Quickstart.md` to do the simplest complete figure generation (generate data and plot it, e.g., in Matlab). This must work in someone else's hands, on someone else's machine. Therefore, you need large datasets ("artifacts") to be in a shared location, possibly outside of a git repo if they are large.
  - Project workflow diagram using draw.io or similar

- **How big should a file be? How big should a function be?**

Resources for coders at work

- The Missing Semester of Your CS Education

CHAPTER

FOUR

WHAT IS A PHD?

- Milojevic et al, *"Changing demographics of scientific careers: The rise of the temporary workforce", PNAS 2018 <Changing demographics of scientific careers: The rise of the temporary workforce>*
- Colin Percival "On the use of a life, a.k.a., why I am not an academic", personal blog from 2020. Beautifully written, a lot of specifics about this one individual but universal lesson in there too.
- Wang Nature "Owning, not doing: my transition from master's to PhD student" 2024. Excellent, powerful. Only adjustment I would make is to replace words like "always" and "all" to "almost always" and "almost all".
- Fleming "Top tips for avoiding last-minute disasters and filing your thesis on time" Nature 2018
- Taylor "Twenty things I wish I'd known when I started my PhD, Nature 2018. I agree with all of these.

Three published or publishable papers, at least two of which are first-author, makes a PhD. Advancement is when you have a draft of the first paper, and the proposal and proof-of-concept for two more.

There are many equivalences (a high-impact paper probably counts for two; 3 middle-author papers probably count as a first-author paper; a widely-forked software..). Then, the onus is on the Candidate to argue this equivalence.

Different PhD programs have different standards. Different co-advisors have different standards.

4.1 Advancement and defence

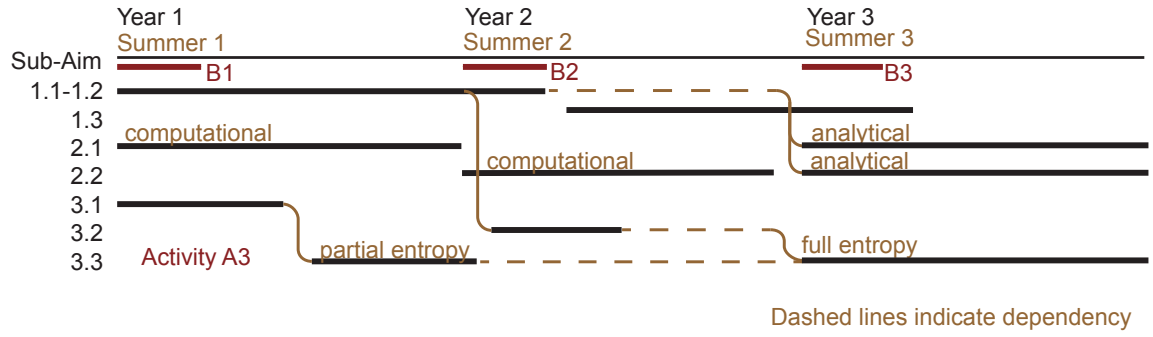
One of the most fruitful, energizing and empowering activities in science is getting a bunch of smart people in a room and talking about a research project with them. One of my favorite memories from recent years is one time when two senior faculty had a project they were excited about, and they got a few other faculty in a conference room to discuss their project idea. Advancement to Candidacy is one of your opportunities to do this! It is both a time to get smart people's feedback. It is also stressful because it involves a tonne of work, and because it is a checkpoint to discuss challenges. Here are some tips.

4.1.1 Advancement tips

- Projects don't need to be related.
- Co-authored papers can be excerpted, provided you add a suitable Intro and Discussion, and a Statement of Co-authorship
- Common pitfall in Advancement presentation: Be clear to distinguish the state of the field and your contribution.
- Unlike for papers, the title doesn't need to actively contain the result.
- Executive summary is self-contained. See "Project summary" examples.

- For published/submitted papers, copy the tex source and dump it in your Advancement write-up. What was Supp Mat or Appendix can be part of main body.
- For unpublished projects, be sure to include
  - Target results
  - Preliminary results: at least one figure
  - How you hope the results address the specific question
  - Timeline

Timeline



- Use bibtex and a modern bibliographic tool for References (Mendeley, ReadCube Papers, . . .).

4.1.2 The prototypic timeline

- T-minus-6 weeks: First draft of write-up to Jun
- Once Jun approves draft:
  - Invitation sent to prospective Committee members
  - Scheduling
- T-minus 2 weeks:
  - Write-up sent to Committee
  - Presentation draft sit-down with Jun
- T-minus 1 weeks: Presentation practice with group
- Weekend or evening before: Final run-through with Jun
- T-minus 0: Advance!

To schedule a meeting, see my old e-mail with *tips on scheduling meetings*.

- Levine "Doctor's advice" Nature 2016 on choosing a Committee

4.2 Quarter reports

It's easy to get lost in details and short-term milestones, forgetting about the big picture, so we put this in place to force ourselves out of the "urgent-vs-important" trap. The quarter report is an opportunity to think about the big picture. This is a short summary of what you've done and are planning to do. It can be as short as 7 sentences, but can be longer.

1. This quarter I planned to…
2. I generated the following results…
3. The main challenges were/are…
4. I presented my work by/at… (paper submissions, conferences, …)

5. In addition to my research, this quarter I (took classes, organized a seminar series, TAed, mentored undergraduate or rotation student…)
6. Next quarter, I plan to…
7. (If <100%) My percent-effort on these projects was… [This is so we can both keep track of time off for personal reasons, projects with other PIs, classes etc.]

Put your report in an editable format (Google Doc, latex, MS Word doc), and we will schedule a special slot to go through it together.

This exercise is valuable if it is used for more than a research update, that is, not to show and interrogate new results. (If you have new results that I haven't seen, then just put it under "6. Next quarter", for an easy win next quarter!)

Bonus topics you're welcome to include (in addition to anything else you want to):

1. For one of my current projects, of all the things that might happen, here is one cool thing, one weird thing, and one bad thing that we could discover:…
2. A skill or technique I want to learn and teach the group is…
3. In the own-learn-teach-delegate axes, here is something I want to delegate to Jun/someone else, and something I want to take ownership of:…

CHAPTER

FIVE

THE GROUP!

5.1 Computing

5.1.1 Local machines

There is a document with account information including IP addresses. (For best-practices reasons, this information is not in a sharable resource.) The document is in the Google Drive AllardLab/Machines.

All of our local lab machines (iMacs, Linux boxes) should have a standardized administrative account and standardized password. All of you should not use this for any actual work. Instead, you each have a user account on your primary machine. Sometimes we ask each other for access to each other's primary machines, for access to files or computing power. If so, make your own account.

5.1.2 High-performance computing: hpc3

The Allard Lab is allocated a certain number of computing hours on UCI's shared high-performance computing facility, Google Drive AllardLab/Machines., under `jallard_lab`.

Our rough guideline is that, if you are using *>1000 core-hour equivalents / week*, we need to make a [budget, e.g., using Google Sheet example. If you are doing exploratory stuff, try to keep the jobs <1000 core-hours/week. If you need help being clever about how to do more with less, let me know!

5.2 AllardLab G Drive

There is a shared Google Drive at AllardLab that can be used for file storage. Each of you can make a dedicated folder under LabMembers, and every project can have a dedicated folder in Projects. Some things, like code, belong in a git repository. Some things, like gigabyte data, belong on one of our external drives in RH274 instead.

Should we make a group Discord?

5.3 Resources

What shared resources should we develop? What outside experts should we call in for this?

- hpc3 tips (Private link, see Jun and Read Lab)
- Adobe Illustrator

Within-team wisdom-sharing has been the single biggest superpower of the Allard Lab. It leads to exponential improvement, like compound interest. How do we maintain that in an asynchronous world? A remote world? My worst concern is that the advantages of asynchronous Work From Home are *multiplicative*, while the advantages of synchronous, in-person work are *exponential* (because they compound). If true, at first it seems like WFH is better, but you pay the price later.

5.4 Rowland 274

- The printer
- The coffee maker
- What else should we do?
- How do we maximally exploit RH274 in the post-covid era?

5.5 Activity

Should we do a weekly Starbucks/Peet's coffee break?

CHAPTER

SIX

WORKING WITH JUN / "A USER GUIDE TO JUN"

6.1 Old e-mails

6.1.1 How to schedule a meeting

One of the most empowering things about being in our big, active community is that we can exploit the expertise of those around us. But one of the most frustrating and limiting tasks is scheduling a synchronous activity with a group. Here are some tips.

Always:

- When you send out a poll of time, always specify a reply-by date, and say explicitly that it is to "protect the calendars" or "protect your schedules" of the respondents.
- If you need 5 members, don't pick 5 and then find a time. Make a ranked list of around 10, and start at the top. Try to find a committee that fits into the time interval. This is much easier than setting a committee then finding a time.

Sometimes:

- Do it in two stages: First to pick day, and a second to pick the time (this reduces, e.g., 5 times in 5 days =25 options to 10 options)
- Offer them to tell you their availability by e-mail, and you put it into the platform.

Rarely, but when possible:

- Wait until someone asks you a favor. Then, in the same e-mail when you respond to their request, remind them about your request.

Technology exists to help, but none of it is perfect: doodle, when2meet, Qualtrics (UCI gets it free), or a google form (most flexible).

6.1.2 An old e-mail about receiving peer reviews

"…it is possible we get our referee reports back …

Even when the reviews are good, they are often worded in a way that sounds harsh. It is difficult to tell whether we should resubmit and rebut, or move to another journal, without careful thinking.

My rule is that, when I get review reports, I read them fully, then I set them aside for 24 hours for my emotions to cool before I think about next steps.

The history of scientific progress is contained in all the papers that were, at first, rejected. The following advice I was given by my friends in high school: If you are not getting rejected some of the time, you are not aiming high enough!"

6.1.3 An old e-mail about accepting a conference invitation

"Many times, I've made decisions to spend time with family and friends rather than scientific opportunities, and I have never ever regretted it. A few times, I've tried to juggle too many things simultaneously, and then I've sometimes regretted it – feeling like I gave both family & science my "leftovers". I have also had events where the most valuable thing was simply showing up, to show support for family or friends, e.g., to give one specific hug, and it didn't matter whether it lasted 1 minute or 3 days. If it were me making this decision, I would think of it as speaking at the conference and giving my family my leftovers (which might be enough) versus going to the family event, and giving the conference my leftovers (in which case we can't commit to speaking)."

6.2 "A user guide to Jun"

1. How long should you stay stuck on something, trying to figure it out for yourself, before coming for help? About one week.
2. The best way to reach me is e-mail.
3. Under normal operations, the turnaround time for e-mails is within 24hrs of "business time" (e.g. weekdays). For logistics (scheduling meetings with a collaborator, we're at a conference, we're hosting a visitor), my expectation is slightly faster or much faster. When you are on vacation, or weekends or planned time-off, it is much slower.
4. **It is more important for me to know when you're on reduced effort than that your effort be maximal.**
5. I take working with collaborators seriously. By far the most impactful stuff we do is collaborative, but collaboration means it's not just about you. I take my role here seriously and expect you to as well. Working on a project with another lead (e.g., grad student or postdoc) changes everything, pressure is on. I take this seriously and you will also be expected to.
6. Time is the single most important resource, both materially and symbolically. Not wasting other people's time means showing up on-time to meetings and not going over in a formal time allotment.
7. I struggle with this tension: As PI, I view it as my job to always have an idea for the **nearest publishable core** that is rigorous and worth sharing with the world; and as a scientist / scientist-in-training, you need the space to explore, wonder, experiment. I am not always successful in balancing these.
8. I struggle with this bias: A few times in my past, a project failed that I invested my whole heart. Correctly or incorrectly, I subconsiously attribute these past failures to **running out of time** (before trainees or lead researchers left or had to prioritize other objectives, . . .), and over-investment in going for something more important or complete. This has led me to a bias towards forward momention, "quick and dirty" and "above threshold" planning. Deadlines (conference abstracts, manuscript submissions, grant timelines) feel to me like lifelines—opportunities to crystallize our work before it slips away into the fog of unfinished ideas. Sometimes, this means I might push for speed at the expense of chasing every fascinating side question, every extra control, or every ounce of scientific wonder. If you ever feel this pressure is undercutting the joy or depth of the work, flag it for me. I'd much rather recalibrate than lose sight of what makes science meaningful. **The downside is that it means *you* might need to be the one to keep your eye on the clock.**

6.3 Notes on finding productivity

- I came up Jun's 3 rules for productivity way way back when I was an undergrad at Queen's. They are not universal. But even after all this time, they still ring true.
    1. Break before you're forced to. Break often and break well.
    2. As a corollary to the first, Push when you don't have to. Find projects that you *want* to push when you don't have to.
    3. And finally, Act as if nothing more is going to get done next week, next quarter, next year (what I now call "the Fallacy of Next Quarter").
- If you look at your agenda and you feel overwhelmed, subdivide your tasks into subtasks. If you're still overwhelmed, cut them up again. Repeat, until each task fits in half-hour chunk. Then start doing. When rock climbing, sometimes you look up from your current position, you see no holds, no path up. It is amazing how different the wall looks when you pull yourself up even by a few inches – new holds and pathways are revealed.
- How much time should you spend making yourself faster, eg by automation? See XKCD Productivity tip