ASA Early Career Researcher Mentoring Workshop – Session summary

Session Topic: (Money &) project management
Discussion Leaders: Rachel Webster and Stephen Hardy

If you only remember three things from this talk, remember these...

1. Have a clear policy in place in advance – clarifies expectations and makes it easier to make hard decisions later on

2. Aim is to maximize expected value = value x probability of success (an integral over all possible outcomes)

3. Agile planning (Scrum method) is useful for ensuring continued progress in research.

Session summary/notes

Part 1: Activity
In groups of ~4, work through 1 of 3 (quite challenging) scenarios. First scenario is a warmup, then things will happen. Included here to show thought processes and useful specific tips.

Scenario A:
The problem is about an instrument for a survey. A postdoc was nominated to lead the survey, a technical issue is found which would require more money. It was bad at 20 per cent sensitivity of the goal.
- First talk to senior people who declined and ask for advice. Risk management and an external assessment is requested to see whether the project can go ahead and what resources that would require.
- another view re-centres the problem and all hurdles involved around the careers of the PhD students involved. Insists on external advice including, if possible, from the concurrent groups.
- Ask senior people who declined to lead the project to mentor and advise. To reassess the usefulness of the project after it's been delayed. Ask the community what use they have for the instrument when its sensitivity turns out to be one-fifth of planned.
- it is important to make sure any de-scoping of the project would still see it useful, get a good engineering assessment of the likely completion dates.

Scenario B:
Tasked with reviewing an international facility and its usefulness (in particular, for Australia). The problem to choose between an optical and a radio project because only one can be supported. The problem than was made still worse as the funding was cut by half.
- One option was to leverage optical/radio using available instruments and swap time/other resource. Funding cut entails re-prioritisation since some projects can now be untenable at all.
- important to have a wide and highly-respected involvement when the decisions to downscale and cut funding/jobs are taken and delivered to the community.

Scenario C:
A group of `young turks' have met at a conference and over a few beers developed a brilliant idea, and decided to go for it. They are located on 4 different continents. They have elected you as the leader, and tasked you with keeping the project on track. How will you ensure that the

project moves forward? How will you fund the project? Then, colleague with key skills left for $300k job – how to fill the gap? Then, negotiation of Nature/Science first authorship on basis of $ contribution and need.
- Determine and justify funding volume, compare to what is available to everyone and when it is available. Speak to senior colleagues. The response to first hurdle was to use your network and ask if someone could do the job of the $300k guy. Re authorship, should have agreed to everything beforehand.
- Expectations of time/telescope time/finance resource contributions. Note that the response to hurdles would depend on the timing of when it arises. External arbitrage of authorships; Science/Nature require you to list the contributions explicitly.
- Division of goals. Deadlines. People resource - not just scientists but engineers and whatever technical people that might be needed. Someone might want to buy into the project. Regarding the authorship, there might be university policies in this respect.
- Importance of regular communications, summarising what's been discussed. Try sending someone to learn from the guy dropping off.

Note: we have a good breadth of shared knowledge. Talk to others for advice and different perspectives! (Seniors, peers)

Part 2: Formal project management tools for 3-10 person teams.
expected value = value (you decide: impact, personal interest, citations) x probability of success (feasibility, skills, time, access)
note that value and risk profile vary, so the integral is complicated.

Top-down (traditional) approach from goals to resourcing: also see diagram on Stephen's slides. Again, need to assess value (benefit) and feasibility (cost)!
Goals determine value
Identify the obstacles to achieving your goals,
and determine the approaches to overcome those obstacles,
(being mindful of any and all competitors)
Your plan connects approaches and obstacles,
and allows you to determine feasibility (mindful of competitors),
given your resources.
Finally, scheduling is then the link between plan and resources.

* set milestones. This is somewhat arbitrary but forces commitment and allows measurement of success
* examine dependencies. Which tasks can happen in parallel?
* consider how to respond to risks e.g. as per scenarios above!
* top-level Gantt chart: timeline showing sequence and parallelisablility of tasks. Can do a very clear 3-month chart but broader 1-year. Log scale could be useful!
Note that this is subject to change, but it is still a worthwhile thought process as you must identify what is important.

Agile philosophy (Scrum method). See image form neonrain.com
Key people: product owner, scrum master (not necessarily the same person), team.
- sprint planning meeting. Identify top tasks and make commitments including timelines. Scrum master can re-allocate (and, sometimes, remove) tasks from the sprint backlog to make sure it is completed on time.
- 1-4 week sprint: daily scrum meeting `stand-up meeting'. How are you going; are there any blocks to what you are doing? -> Who can help, or should we abandon that task? In business,

it's daily (15-minutes) status updates, in science an update 2-3 times a week might be enough.
- burndown/up charts track effort available/spent over the time of the sprint. There is different software that supports scrum.
- sprint review after fixed deadline: inbuilt accountability. At the end of the sprint, deliverables are delivered, and DO NOT CHANGE.
Note that astro busy weeks are inspired by this process. We are seeing an increase in uptake.
* ideal for science research due to iterative nature.
* works well for software development, test-driven programming works well. Identify the tests in advance.
* also good for distributed collaborations; need to prioritise the priorities!

Now, using insights from this process to make the top-down process agile:
Reconsider your plan as a prioritised backlog of tasks.
Regular feedback on day (or 3) scales, and month (or two) scales.

Also see 'Essentials in Scrum' (book) and 'Agile methods in Research' (paper)

Interesting quotes from the discussion

`The best way to waste money is to work on something that is not working' – Stephen Hardy

`Universities mentor people to get grants' – Rachel Webster