

# To do today

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Moving research quickly forward to publication tops the pre-tenure 'to do' list. **Kendall Powell** ticks off project management tips.

**W**ho hasn't written a task on their to-do list just as it is completed, so they can still experience the joy of crossing it off? Kim Barrett, a physiologist at the University of California, San Diego, finds it no less satisfying to check things off the to-do list on the digital organizer that goes with her everywhere.

"I've always been a list maker — not just of the big things, but of the intermediate steps too, outlining what needs to get done to get a publication out," says Barrett, who is vice-chair for research at the university's department of medicine. Writing lists is the main way investigators keep track of their research projects and goals.

But new investigators, hit simultaneously with piled-on administrative responsibilities and freedom to pursue their research interests, may find it increasingly difficult to track all lab activities, either mentally or with a clutch of sticky notes. Successful project management involves directing many research threads without letting individual experiments, ideas or trainees slip through the cracks.

"You want your team focused and moving ahead, producing publishable results as quickly and as frequently as possible," says Federico Rosei, a nanomaterials scientist at the University of Quebec, Canada. He and other project-juggling experts share their methods of tracking projects, organizing lab staff and expediting the final product: they use paper, programs and people to achieve that highly desired 'p' — publication.

## Paper

Structured project management is needed when you have "project strings going in several directions at once", says Victoria McGovern, programme officer for infectious diseases at the Burroughs Wellcome Fund in Research Triangle Park, North Carolina. "It ensures that important things don't get shoved to the back of the bench when more urgent things come up," she says.

Most investigators keep a running list, in mind or on paper, of tasks to move research forward. They use e-mails, voicemails and calendar alarm programs to remind them of deadlines and administrative duties. Rosei admits that he often pulls off the highway to scribble down ideas on the back of any available

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## LAB RULES TO LIVE BY

Gillian Wu, an immunologist and dean at York University in Toronto, runs a research group of about 15. To keep projects going, she demands high-quality data and no-nonsense workers.

She sets these tough standards for herself:

“Always make a list of what is most important for today and do it. Don't let anything get in your way.”

“I make graduate students do the first draft of a paper and tell them I want to see it in a week — no extensions.”

“Make sure you only give projects the time that's needed and not a minute more.”

...and for her lab members:

“Remind me of this later — if you don't get back to me, I won't get back to you.”

“No sloppy experiments or trial runs are allowed. Which gel do you want to publish?”

“You should be able to turn to page 59 in your lab notebook and tell me what you did that day.”

“We're in this together. I'll help you get your PhD but you have to do your part.” K.P.



K. WALSH

writing surface. Continually updated paper lists can eventually become an outline for a manuscript.

But McGovern warns that keeping lists without a specific time course in mind can lead to thinking: "I'm going to get all these things done because I've written them down." Instead, she says, "Write them down with a calendar in front of you." Otherwise you are likely to get frustrated when teaching or family activities interrupt your science, or vice versa.

Shri Kulkarni, an astronomer at the California Institute of Technology in Pasadena, keeps an hour-by-hour web-based calendar roughly scheduled a year ahead to track important conferences and grant deadlines and let colleagues know "which part of the world I am in and where to call me".

Barrett and McGovern advise new investigators to take some quiet time to plan for project advancement, using the first three months of a year to do a detailed organization of the lab's agenda for the next nine months, or half an hour each morning (before trainees arrive) to plan what has to be done that day.

### Programs

As the size of a lab and the number of administrative duties increase, keeping all those details in mind becomes a burden. For the overtaxed brain or for very complex research projects, McGovern recommends formal project-management software.

These programs allow you to break a project into smaller tasks and figure out whose expertise and what materials each piece requires. "It lets you tie together pieces of work that make sense and the dependencies between them," McGovern says.

The programs automatically redraw flow charts and reset deadlines when something unexpected comes up. McGovern was "geekishly excited" to find out the latest version of her software communicated with her e-mail program better, so "things don't fall off my radar screen". One of the most useful aspects, she says, is that the program helps you identify which parts of a project can move forward even if another part is stalled.

### People

Another way to free up brain capacity is to delegate responsibility for remembering the details to senior students and postdocs. Recruiting the best people is arguably the first step in getting projects rolling fast.

"The main difference between projects that go well and those that stall are the people," says Arshad Desai, a cell biologist in the school of medicine at the University of California, San Diego. "Young principal investigators feel they should recruit anyone, but it's wise to try to recruit the right people for projects."

Kulkarni puts third-year graduate students in charge of every aspect of writing and submitting proposals and manuscripts. His lab staff also have carte blanche to order items costing less than \$1,000. "It's not just a time-saving device on my part," he explains. "It's a way to win their respect." It's important for lab members to learn that research, like any other job, requires that certain tasks get finished by the end of each day.

Kulkarni admits that his philosophy does not result in immediate improvements in efficiency, but says younger lab heads should be "willing to play longer bets". Those bets produce fourth- and fifth-year students who are valuable assets in meeting lab goals.

When Gillian Wu became dean of science and



Help fortune to smile on you: don't wait until you think the story is complete before you start writing, say Federico Rosei (top) and Kim Barrett.

engineering at York University in Toronto, she had to get tough on efficiency (see 'Lab rules to live by', opposite). She has strict rules limiting Internet surfing and political discussions, and her 'right-hand' lab manager keeps on top of day-to-day progress. Because Wu spends a lot of time away from the lab, weekly meetings are mandatory for all.

"They have to bring their own primary data, not just words or histograms," says Wu. A principal investigator at any stage has to look at the primary data to catch unanticipated results that might be important for project direction, she adds.

Desai holds group meetings lasting 60–90 minutes, and confers with the presenting student individually for an hour or two afterwards. "That gives me a three-to-four-hour chunk to just think about that specific project," he says, and students get his undivided attention on a regular basis. Many investigators keep folders for each person's project to review and update at lab meetings. But people invariably get stuck, technically or conceptually, and a good adviser must help them navigate through.

Wu and Barrett stress that a new lab head should stay at the bench for as long as possible to understand the daily rhythm and technical requirements of projects. "You actually have more quality control of the data and a sense of how to move things along," says Barrett. "There will be time enough to sit at the computer." She also tries to foster an environment in which staff can freely express the hurdles holding them up. Hearing the 'bad news' early, she notes, might be critical to understanding the scientific process under study.

Wu demands clean, clear notebooks so problems can be solved by going back through data line by line. She also expects all experiments to be carried out to publishable quality. Both those rules smooth the transition to writing a paper — with ready-made materials and methods, results and figures.

### Publication

Knowing when a project has reached the point when a paper can be crafted is tricky, experts admit. Rosei says an introduction can be written in advance, as you should know why you are pursuing the project before starting work. He urges researchers not to delay writing until they have a 'complete' story.

"It is impossible to put the word 'end' to anything, and you don't want to be scooped because someone else had the guts to go out with the incomplete story," he warns. As soon as there is a coherent story, he says, have the student write a first draft.

Barrett agrees, and begins a paper "once I've got a sense that there's some flesh on the bones of the hypothesis". She instructs trainees not to delay to do 'loose-end' experiments that can be added during review. And she combats inertia by giving students a deadline for a small, easy section, such as methods, first.

Desai notes that writing papers with students, especially focusing on the discussion section, gives him a good opportunity to review the literature. He gets his students to keep up with the finer literature details.

"Not having too many details in your head helps you see the big picture and new insights," Desai says. After all, at the top of every researchers' career-long to-do list is guiding ideas into reality. ■

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