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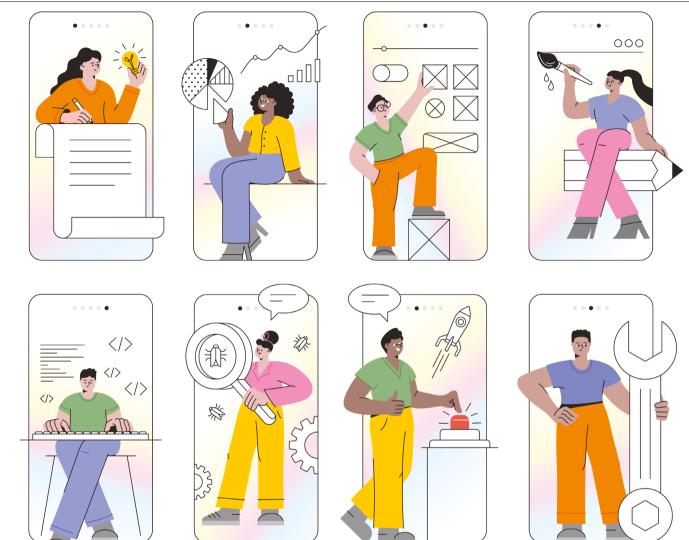
FIVE WAYS IN WHICH ROOKIE LAB LEADERS CAN GET UP TO SPEED

An array of spreadsheets, courses and online resources are available to support principal investigators leading their first research groups. **By Jyoti Madhusoodanan**

Shortly after launching her laboratory last year, Catherine Schrankel began looking for people to fill it. Without a team, Schrankel had to do everything: hire students, organize freezers and establish protocols, among the many other responsibilities of a new principal investigator (PI). "I was just not prepared for how tired I would be at the end of the day," recalls Schrankel, a developmental biologist at San Diego State University in California. The first few months were "mildly controlled chaos", she says, as she juggled dozens of tasks for which she had little training.

Schrankel's experience, unfortunately, is not unusual. Would-be academics spend years as graduate students and postdocs, training to conduct rigorous scientific research. But those skills provide scant preparation for leading a team of one's own, which many new PIs liken to running a start-up firm. Their responsibilities balloon from managing their own research to mentoring students, paying employees, tracking inventory and learning to lead effectively.

"A lot of this role has to be learnt on the job," says Christina Termini, a cell biologist at the Fred Hutchinson Cancer Center in Seattle, Washington, who started her lab last year. "Running the lab is like running an experiment — it can always be improved until we find the best protocol."

But finding that perfect protocol is a daunting task. Many new PIs feel the need for support systems and mentorship to help them navigate their roles.

A 2019 survey of scientists in the United Kingdom found that about 25% of new PIs felt that they received no mentoring, and many struggled to recruit students and postdoctoral researchers (S. E. Acton *et al. eLife* **8**, e46827; 2019).

"You're used to being a scientist and now, all

of a sudden, you're a manager, you're teaching classes and you have to physically build up your lab," says Katharina Maisel, a bioengineer at the University of Maryland in College Park. "It's like drinking from a fire hose." Recognizing the challenges involved, some researchers have developed tools and resources to support this complex career transition. If you're a new PI — or even if you're established — here are five approaches that could help you.

Manage money better

New lab leaders typically receive seed funding from their institution, and many PIs have their own grants. Each source of funding comes with its own deadlines and can be used only for certain projects or categories of expense. Keeping track of these moving parts can be especially stressful for first-time PIs. Reproductive biologist Marcia De Almeida Monteiro Melo Ferraz, who moved to Germany to set up her lab at the Gene Center Munich in January 2021, recalls the challenge of trying to scale up her bookkeeping skills. She went from managing her own modest finances to handling those of a research laboratory: suddenly, she was monitoring almost €2 million (US$2.1 million). "We are not taught how to keep track of finances," she says.

Robin Stewart, a data scientist and software developer in Seattle, Washington, says a dinner with friends in 2017 brought this disconnect into sharp relief. One research group leader mentioned that lab finances were weighing on her mind, and another chimed in to relate how they had to switch labs in week one of graduate school because their adviser was unaware that the first lab was running out of funds to support an incoming student.

The conversation spurred Stewart to create a solution that year. Called Spendlab, it is a web-based budgeting tool designed to help PIs keep track of their lab's funds. Users enter information on income from grants and on expenditures, including graduate-student stipends, equipment, supplies and other lab costs, and can update and visualize their finances on a weekly or monthly basis to catch problems before they occur. PIs can view spending for each pot of funds separately and can model scenarios, such as how long funds will last if they're spent on certain needs versus others. Software licences cost $150–$400 annually for individual users.

Researchers at around 60 universities now use the service, Stewart says. Among them is Shaun Mahony, a computational biologist at Pennsylvania State University in University Park, who uses Spendlab to visualize whether future expenses, such as a student's stipend in four years' time, have been accounted for when calculating how much of a grant has been spent. "For individual labs, it's very opaque and hard to get a sense of how much you're spending on any given project at any given time," he explains.

Another Spendlab user is Ferraz. Her funding arrives in instalments, but some of her current grants stipulate that she must not have more than 20% left unspent at the end of a funding period. Spendlab helps her to visualize how much she can spend in a year and to schedule equipment purchases so that she neither loses nor misspends her money. "If I need to buy equipment, I can see: can I pay this year? If I do, where is it coming from?" she says. The software "has been a game-changer", she adds — although it would be even more helpful if it allowed her to download spreadsheets. That feature is in the works, Stewart says.

Sort out supplies

With funding in hand, one of the first things new PIs must do is to shop for equipment and supplies. For many, it's their first experience of identifying the right vendors and the best prices, and of grappling with institutional policies and procedures for capital purchases. Luckily for Maisel, she had helped a mentor to move her lab to a new institution, an experience that provided some tips on how not to overspend your budget when starting out.

> ## "I really want the entire scientific community to be able to benefit from these resources."

One key strategy, Maisel says, is to do a price comparison. Common equipment such as refrigerators might be more economically priced at a shop than at a scientific equipment company, and other items of lab kit can be replaced with kitchen gadgets for a fraction of the price. When needing to heat a sample to what she calls "seething but not boiling" temperatures for an experiment, for instance,

Maisel has used a vegetable steamer instead of a more expensive water bath. "People have come up with all sorts of tips and tricks to not spend as much but still be able to do the same things," she says.

Beyond that, researchers can stretch their budget and minimize waste by keeping orders and inventory organized, Termini says. Her team didn't have a schedule for placing orders when she started her lab — the group simply bought materials as needs arose — but now tracks inventory and places orders on a consistent, weekly schedule. "That's helped us to streamline the science and enables us to save money," she says, because it prevents duplication and minimizes shipping charges.

Like many researchers, Termini maintains a suite of spreadsheets to track inventory and organize laboratory supplies such as antibodies. Researchers readily share templates for such spreadsheets when asked, but not everyone has an established network to provide such help.

When the popular inventory-management tool Quartzy began to charge users this July, Termini noticed a rise in academics on social media seeking alternatives. When she offered her spreadsheet template on Twitter (now called X), her tweet went viral: nearly 500 researchers around the world requested the document. Over the next few months, Termini made her inventory spreadsheet (and other management tools, such as a template to request information for letters of recommendation) freely available on a website named Organizō that she founded to help scientists organize their work.

Schrankel, who was struggling to keep up with the logistics of lab inventory, learnt about Organizō on Twitter. "We were swimming in orders as things were coming in — antibodies for sea-urchin stuff, human stuff," she says. "Figuring out how to organize the various fridges and freezers was basically like a *Flintstones* [cartoon] car … not very efficient." Switching to Termini's templates has eased her transition from lab worker to lab leader, she says.

Researchers can download and customize Organizō's templates for their own needs, Termini says, thus saving them from reinventing the wheel. "I really want the entire scientific community to be able to benefit from these resources that I think would've helped me at all stages in my training," she says.

Build lab culture

Finding the right people to work with — whether team members or collaborators — is also crucial to a laboratory's success. Ferraz found she had to look beyond credentials to find the right fit. An applicant's CV and recommendation letters "don't make a true picture", she explains.

Now, Ferraz tries to understand students' expectations in advance and works with them

Prachee Avasthi founded New PI Slack.

to create a shared document that outline her own. Some students need a nudge to work harder, whereas others need reminders to maintain a decent work–life balance, she says. The file isn't a formal employment contract and remains private to the PI and student. In addition to general guidelines about conduct, it details what is expected in terms of record-keeping: that electronic laboratory notebooks be updated every week, for instance, and results analysed within a couple of weeks of completing an experiment. "It helps to set expectations from both sides and reveals what I can offer to help them," Ferraz says. Termini, who uses a similar system for her team, has shared a template for such a document on Organizō.

When hiring postdoctoral scholars, Ferraz recommends inviting them to visit the lab and work with the team for several weeks before either party decides whether they are a good fit. Her grants often allow her to support a postdoc for such stints, she says, and she herself benefited from such an arrangement, spending six months in her eventual postdoctoral lab before officially joining. "Sometimes it might not be a good match for the lab environment," she says. "If you have a person who is not a good fit, it changes the dynamic of the group."

Find a community

Many institutions support newly hired faculty members through training programmes covering team leadership, mentoring and institutional procedures. But real-time feedback and advice on common challenges can be trickier to access. As a new PI at Dartmouth College in Hanover, New Hampshire, cell biologist Prachee Avasthi launched a support group on the online collaboration platform Slack to help to fill that gap.

Formed in 2016, the New PI Slack workspace now boasts more than 1,500 members around the world. As well as conversations about equipment purchases, the community has channels to discuss grant and tenure applications, share technical protocols and templates for grants or mentoring plans, celebrate recent successes and more. Another channel pairs up random members once a month for one-to-one conversations. One such interaction led Maisel to strike up a close friendship with another member, and the two of them hope to collaborate on a future research project.

"The New PI Slack was one of the biggest resources for me when I started out," Maisel says.

An advisory board made up of early-career PIs moderates discussions, which are confidential. And once they are awarded tenure, members are encouraged to move across to another Slack workspace called Mid-Career PI. "We want [the New PI Slack] to stay a safe environment," explains Maisel, who serves on the group's board. "We don't want anybody

Developmental biologist Catherine Schrankel (left) set up her lab from scratch.

who's voting on somebody's promotion case [to be] in the same Slack group as somebody who's getting advice on how to put together their package."

George Burslem, an epigenetics researcher who started his lab at the University of Pennsylvania in Philadelphia in January 2020, and is a member of New PI Slack's advisory board, says the Slack community has provided a place to vent frustrations, seek advice on difficult situations and combat the isolation of being a new PI, as was especially the case during the pandemic. Every new faculty member in his department is assigned a mentoring

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committee that they meet with every six months, Burslem says; he relies on the committee for knowledge about the university's workings, feedback on grants and papers, and other aspects of leading a lab. The Slack group provides a different sort of community: "It doesn't feel like a replacement for [having] a PI or a supervisor. It fills the space of peer mentoring," he says. "It's like having a lab mate, having other people in similar situations in different places."

Take leadership training

Whether carrying out doctoral studies or postdoctoral research, most scientists gain some hands-on experience of leadership by teaching classes and mentoring and training newer lab members. But leading one's own research team requires a different level of skill: PIs must become nimble managers, training a diverse group of researchers at different career stages

to be independent, yet work as a cohesive, inclusive team towards a shared vision and goal. Some researchers can gain those skills in their everyday life — for instance, through team sports. Leadership courses offer another route to success.

Larger institutions sometimes offer such training through postdoctoral associations or other programmes, and funding agencies and professional societies do likewise. When starting his laboratory, Burslem signed up for a programme organized by the US National Institutes of Health that trained group leaders, PIs and others on various aspects of managing people — including having difficult conversations, finding ways to support students of diverse backgrounds and recognizing stress.

The early years of building up a lab are especially important in establishing an inclusive culture, says Celine Carret, who conducts leadership courses for the non-profit group EMBO Solutions in Heidelberg, Germany. Learning to identify and defuse tensions in this phase is crucial, she adds. PIs can, for instance, watch for warning signs such as lab mates avoiding one another or not taking coffee breaks together, or a person being targeted with particularly direct or hurtful questions. The training offered by Carret and her colleagues helps new PIs to handle such scenarios by equipping them with communication skills as well as building their understanding of how effective teams grow and function.

That can make for an improved working environment for lab members, but the PI ultimately benefits, too, because better management is "like a circle", Carret says. "The more you help other people develop and grow in their own skills and independence, the more they can help you with your research goals."

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