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—Alice Sapienza,
Simmons College

will finish experiments more quickly and completely.” Then, O’Neil asks them to collect and analyze data to see if the data fit the hypothesis.

Becoming an effective leader

Success in science is often measured by number of publications, citations, and similar metrics. But when Alice Sapienza, a chemist with a Ph.D. in organizational behavior who is now at Simmons College in Boston, Massachusetts, asked experienced scientists what qualities they most admire in a scientific leader, she got a very different answer.

Sapienza says her research suggests that the best leaders are those with the best people skills. She surveyed more than 200 scientists and engineers from the United States, Europe, and Asia, asking them to describe the most effective scientific leader they knew. Leading the list were people of “caring and compassion,” followed by those who “possess managerial skills” such as effective communication and conflict resolution. Technical skill was a distant third.

Another common misperception among scientists, she says, is that managing people in a laboratory environment is somehow different from managing people in other types of workplaces. “People are people,” Sapienza says. “There’s a very short list of things that go wrong when people work together.”

So how do you make sure those things don’t go wrong? “There is no easy fix,” she says. “It should not be surprising that it will take time to become an expert in the discipline of interpersonal behavior.”

Carl Cohen, co-author of the book *Lab Dynamics: Management Skills for Scientists* (and a former *Science Careers* contributor), recommends taking short courses in management and reading books such as William Ury’s *Getting Past No*, which he found invaluable in developing negotiation skills. There’s a whole literature out there, he says, that can be very helpful.

O’Neil recommends yearly performance evaluations for everyone in the lab, including the lead investigator, using what’s known as a 360-degree evaluation in which people give and get constructive feedback from supervisors and those they supervise. This kind of assessment taught Sapienza that she needed to be more explicit with her students and postdocs in setting goals and expectations.

Formalizing training

Not long after her trial by fire at Wisconsin, Hull, a former Burroughs Wellcome Fund (BWF) Career Award recipient, got a taste of

Managing Scientists

Christina Hull chuckles when asked where scientists acquire their interpersonal skills. She acquired hers the same way most scientists do: They were thrust upon her when she started her laboratory at the University of Wisconsin, Madison. Suddenly she was the boss, faced with the daily challenges of motivating students, negotiating with peers in committee meetings, resolving conflicts in the lab, and a dozen other tasks that require what are broadly called “people skills.”

Hull acknowledges that possessing good management ability is essential to productive scientists, but she received no formal management training prior to taking the reins. Her experience is not unusual. Fully half of U.S. postdoctoral scientists responding to a 2003 Sigma Xi survey said that they had received no training in lab or group management, and nearly all the rest had received only ad hoc or “on-the-job” training. Most wanted formal training in lab management, but only 4% had attended a workshop or done formal coursework.

Even established senior scientists recognize the disconnect. “Science is odd in some ways,” says Robert Doms, chair of the Department of Microbiology at the University of Pennsylvania School of Medicine. “You spend all your time as a stu-

dent and postdoctoral fellow learning how to be a good experimentalist. Then you become an independent scientist, and if you are successful, before long you are no longer doing experiments because you don’t have any time, and personnel management becomes a major issue.”

Like many scientists, Doms modeled his management style on that of his scientific mentor, Ari Helenius, a virologist at Yale University School of Medicine, whose style Doms admired. The ad hoc method can work sometimes, but it’s hit-or-miss.

“There are some horrible pathologies in some labs in the relationships,” says Edward O’Neil, director of the Center for the Health Professions at the University of California, San Francisco (UCSF), who offers laboratory management workshops throughout the United States. “People stay because they are inspired by the science, but they leave the training in some of these labs really wounded people. ... Then they will use that as a model for leadership.”

In his workshops, O’Neil tries to get scientists to change their behavior by asking them to frame a hypothesis. For example, “If I stop yelling at my technician when he makes a mistake and work together to correct the problem, he



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—Christina Hull,
University of Wisconsin,
Madison

TOWARD A PHILOSOPHY OF RESOURCE MANAGEMENT

IN A COMPETITIVE RESEARCH ENVIRONMENT, THE USUAL virtues—bold ideas, solid research qualifications, a passion for discovery—can't guarantee a satisfying and lasting career. Even in an academic setting, serious researchers need financial knowledge and a businesslike attitude.

Michael McClure, former chief of the National Institute of Child Health and Human Development's Reproductive Sciences Branch, compares the modern research environment to a shopping mall in which the landlord—the university—leases space to new businesses—junior faculty members—and provides start-up assistance. The proprietor expects those fledgling operations to become self-sufficient quickly and provide a reliable source of revenue for the university. "You need to understand the principles of business and develop skills to market your business," McClure says. "In the harsh environment today, there's very little forgiveness in the system."

A programmatic vision

Like any successful businessperson, your most important requirement is a clear plan. "It's not all about money," says Joan Lakoski, associate dean for postdoctoral education and associate vice chancellor for academic career development at the University of Pittsburgh in Pennsylvania. "It's about defining what your research goals are and then using the fiscal tools to be able to accomplish the work." "Grant reviewers will be looking for a long-term plan," agrees Maryrose Franko, senior program officer for graduate science education at the Howard Hughes Medical Institute in Chevy Chase, Maryland. "Money follows the vision."

formal training when she participated in a 5-day lab management "boot camp" sponsored by BWF and the Howard Hughes Medical Institute (HHMI) in Chevy Chase, Maryland, in 2005.

"I decided to go to [the course] grudgingly," she acknowledges. "I wasn't sure it was worth a week of my time." She feared the course would be a bunch of "business-speak" that didn't apply to the issues she faced in the lab. But by the end of the course, she was glad she had come. She says she valued hearing the collective expertise of experienced scientists who had been through the same issues she faced, and she learned enough about her own personality and management style to make changes she says have improved her skills as mentor and manager.

"I realized there were some things I was doing that my lab expected me to do differently," she says. "My students pointed



So how do you develop a vision and a long-term plan? Your adviser probably doesn't expect you to think hard about the direction her lab ought to go in or see to day-to-day details such as preparing budgets, tracking expenses, building financially sensible collaborations, or juggling multiple funding sources, but she probably will be willing to help you learn if you express an interest.

Once your vision is in place, draw up a detailed chart of the equipment and supplies you'll need to do the work you intend to do once you're independent. Figure out where to buy it, how much it costs, and what equipment you might be able to share with other scientists.

Funding your venture

A programmatic vision won't just help you land job offers; it will also guide your negotiations for start-up funding.

Many new faculty members are afraid to ask for too much, so instead they ask for too little, endangering their success during the critical first years of their research careers. Take the guesswork out by knowing what you need. Because you made a list, you know how much your lab will cost to start up and operate until research grants start flowing—and you can spell it out in detail for your future landlord. "You shouldn't shoot for the moon, but it does the university no good to nickel and dime you," Franko says.

When grant-writing time comes, many researchers target only funding powerhouses like the National Institutes of Health and the National Science Foundation. But it's also worthwhile to explore other possibilities

out that I don't manage interruptions well—that I allow them to interrupt me too much. I thought that was interesting because I was very much into my open-door policy. When I became more protective of my time, they respected my time more."

Peter Bruns, vice president for grants and special programs at HHMI, says that HHMI is unlikely to offer the lab leadership course again. Instead, the institute is trying to disseminate its model

by "training the trainers": teaching the nuts and bolts of how to run such courses to a core group of 17 interested professional societies and universities that want to offer them.

HHMI gave small seed grants to each partner and asked for evaluation data from the workshops. In aggregate, more than 90% of respondents who participated in the courses said that they would recommend them to a colleague, according to Maryrose Franko, senior program officer at HHMI.

Michelle Hermiston, a new assistant professor of pediatric hematology at UCSF, took a laboratory leadership course offered by UCSF's office of postdoctoral education this past spring. "I'm a huge cheerleader for the leadership course. I found it extremely useful, as did all of my friends who also took it," she says. She particularly appreciated the tips on how to assess work styles and how to ask difficult questions about potential weaknesses during the



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—Michelle Hermiston,
University of California,
San Francisco

including specialized federal programs, state agencies, private foundations, industry partnerships, and community grants. Even small supplemental grants stabilize a laboratory's cash flow and support auxiliary materials, activities, or personnel that a primary grant might not. Small grants can also fund exploratory work that can lead to more significant funding later on.

Before sitting down to craft a grant proposal, it's essential to understand different funders' priorities, says James Kitchell, director of the Center for Limnology at the University of Wisconsin, Madison. The best way to gain that understanding, he says, is to read funders' strategic planning documents, study successful proposals, and talk with program officers. Program officers are eager to discuss strategic priorities with researchers; they can also advise scientists about funding possibilities at foundations and other agencies. Many funders offer online grant-writing tutorials and other lab-management tools. Some agencies host regional grant-writing workshops, and most major scientific conferences have substantive lab-management components. "As a researcher, you are an entrepreneur, and what you have to offer the marketplace is ideas," Kitchell says. "It's to your advantage to know as much about the process as possible."

Every business needs a steady and diversified supply of revenue, and a lab is no exception, so take a holistic view of your funding portfolio. One big grant is nice, but a financially healthy lab has a variety of grants, large and small, that come due at different times.

Spend wisely

Knowing how to spend your laboratory's money is as important as knowing

how to get it. A growing number of institutions provide formal financial-management training for scientists. Career-development workshops at the University of Pittsburgh, for example, help postdocs and junior faculty members prioritize research goals, develop financially manageable research programs, improve grant-writing skills, write budget justifications, and navigate fiscal policies. The Laboratory Management Institute at the University of California, Davis, offers a yearlong course for postdocs that teaches skills including writing grant proposals and protecting intellectual property.

Husbanding your resources is key. Burn through cash too quickly and you'll have to cut back on research or let people go. Play it too conservatively and you'll end up with an admirable surplus that you may not be able to roll over into the next year—along with a less-than-stellar CV.

Getting it right requires predicting how much money you'll need for the current funding period, building in overlap among multiple grants, tracking expenditures faithfully, and knowing how to save a few bucks when you can. Some tried-and-true scrimping strategies include negotiating with equipment and supply sales representatives, who are usually eager to

get in on the ground floor at a new laboratory; buying used or surplus equipment online; and sharing equipment with colleagues.

—SIRI CARPENTER

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—Maryrose Franko,
Howard Hughes Medical Institute

hiring process. "For many of us who have been trained in science, learning how to do those things can be challenging."

Hermiston says that the course has already had an effect in her lab. Her technician told her recently that she has become much more open to feedback and said how nice it has been not to have to guess what she is thinking. "I've become much more cognizant of what level of hands-on management people need at different stages of their training," she says. "It's probably changed some of my behaviors for the better in that I give and ask for feedback more often."

The United Kingdom has decided that such training should come long before a scientist finds herself running her own lab: A fundamental change is under way that aims to make "soft skills" a part of doctoral education in science. In 2002, a government-commissioned panel recommended that all science graduates receive such training. In answer to those recommendations, Research Councils UK, the nation's primary research-funding body, now disburses £21 million (about U.S. \$42 million) per year to universities for professional devel-

opment for graduate students and postdocs in areas such as project management, supervising others, and communicating with the public. The goal isn't to improve laboratory management per se; it is, rather, to give graduates skills that make them more attractive to potential employers in all sectors.

There is still some skepticism on the part of supervisors, and some people believe that the money would be better spent elsewhere. But the program seems to be having an effect. "We're probably about halfway there in terms of getting transferable skills into Ph.D. programs," says Iain Cameron, head of the Research Careers and Diversity Unit within Research Councils UK. "We've made a huge amount of progress since 2003, but we've still got some way to go."

Such skepticism is not confined to the United Kingdom. When Elizabeth Ellis, director of Graduate Training in Biomedical Sciences at the University of Strathclyde, U.K., gave a talk on the U.K.'s integrated-training model at an Association of American Medical Colleges meeting last year, she encountered skepticism there as well. "There seemed to be

some resistance to mov[ing] towards skills-based training in the U.S., and there was little understanding of why transferable skills were needed," she writes in an e-mail.

Brian Schwartz, a physicist and vice president for research and sponsored programs at the Graduate Center of the City University of New York, has been co-teaching courses on business skills for scientists for 10 years. Schwartz says students and postdocs are often savvier than their supervisors about the need for such skills in the job market. He advises students to take such courses throughout their graduate careers. "Even while getting a Ph.D., take some other courses," he says. "A lot of students say, 'But my thesis adviser won't allow me.' I say 'Don't tell 'em.'"

"Scientists have to learn that it's not the science they're managing, it's the people who are doing the science that they're managing," says Sapienza. "Sometimes that's a quantum leap for people to understand."

—KARYN HEDE

Karyn Hede is a freelance writer in Chapel Hill, North Carolina.