Career Trends

Transferring Your Skills

Science Careers
FROM THE JOURNAL SCIENCE AAAS
You’ve successfully navigated your way through grad school or your postdoc until you’ve hit a roadblock: For either personal or professional reasons, you have to switch fields, jobs, or even a new career.

Now what? Well, dear reader, you are more mobile than you think. More fields, such as translational medicine, industry, and high tech, are becoming interdisciplinary, which means that the knowledge and critical thinking skills you have already gained can be used and appreciated by your new peers.

Parlaying your skills might require a culture shift and change in lexicon. Your research becomes “project management.” Your roles supervising undergraduates or graduate students are now “managerial/supervisory skills.” Your hours spent in committee meetings or journal clubs become “team-focused” or “collaboration” examples.

Depending on your mentor, who may or may not view a career path as “academia or bust,” you might have to learn to guide yourself through this transition. Or “manage up” by teaching him or her about the process.

Academia is no longer the professor-making machine that it once was. Given that there are more Ph.D.’s than tenured positions, chances are high that an alternate career path, such as industry, publishing, or law, may need to be taken. But as the articles we’ve included in this supplement show, taking the road thought to be “less traveled,” as Robert Frost once said, may make “all the difference.”

Jackie Oberst, Ph.D.
Assistant Commercial Editor, Science

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Editor: Allison Pritchard  |  Copyeditor: Bob French  |  Designer: Amy Hardcastle

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Transitioning fields between a Ph.D. and postdoc
By Alaina G. Levine | August 2015

It takes guts to pursue a career in science and even more to switch fields midstream. Executing a disciplinary change between the Ph.D. and postdoc appointment requires thoughtful analysis, research, and due diligence. You have to demonstrate to your new colleagues how your expertise can be a potential boon for their research group, and you have to gain an understanding of the new field and its culture and language. For researchers who have the fortitude to start over in a new discipline and can effectively market their abilities, changing fields can lead to a career homerun.

Amir Erez is a theoretical physicist who yearned to change the world. “People would ask what I do and I had trouble explaining what impact my condensed matter research could have on our lives,” he says. As a graduate student at Ben Gurion University in Israel, he had the chance to work on a collaborative project at Princeton University for a few months when he heard that a biophysics professor from his alma mater was on sabbatical at Memorial Sloan Kettering Cancer Center (MSKCC), about an hour away in Manhattan. He reached out to the scientist and the two hit it off, remained in contact, and 2 years later, Erez suggested that he work with him, under a fellowship from the Human Frontier Science Program, an international nonprofit that supports postdocs who move into the life sciences from other disciplines. Now a postdoc at MSKCC, Erez uses techniques from the physics of complex systems to study the dynamics of immune response in the context of cancer. “Suddenly I could ground my research in the real world and not just keep it in the Ivory Tower,” he notes.

The decision to change fields is not always about personal preference. Some professionals do so to ensure their employability. Maria Patterson had been concerned about the narrowing career opportunities for astronomers who wanted to remain in academia. “I knew it was a rough road ahead,” she says, where less than 10% of astronomy postdocs land tenure-track positions in the field. So she began looking at other vocations, including data science. As a graduate student, she was accepted into a fellowship program that exposed her to big data problems, and it was during this experience that she met her future principal investigator (PI), a computational biologist, with whom she began corresponding and discussing potential collaborative projects. She ended up at the University of Chicago in the Center for Data Intensive Science, Knapp Center for Biomedical Discovery, where she currently uses her expertise in spatial analyses to mine electronic medical records for patterns of geospatial clusters of disease. She describes her move as enjoyable as she now uses her skills in novel ways. “In astronomy, as you move up, the topics become very narrow and if I had an impact it would be small and only a few people would know about it,” she says. “But in medicine, the research has the potential to have a great impact on a lot of people.”

Other scientists discover and delve into new disciplines while trying to solve the classic “two-body problem,” in which two academics who have a personal relationship must job search at the same time. Such was the case with Shaun McCullough, a postdoc at the Environmental Protection Agency (EPA). When his wife landed a post in Research Triangle Park (RTP), North Carolina, he became the “trailing spouse” and cast a wide net to find a job in the region. Educated in biochemistry and molecular genetics, McCullough found a home in the Clinical Research Branch of the EPA’s Environmental Public Health Division in RTP, where he conducts both clinical and in vitro cell-based research in toxicology. It wasn’t what he expected to do when he originally chose the life sciences, but he finds his research to

“I used to communicate using quantitative information and theoretically rigorous approaches, but during my postdoc I had to deal with more qualitative information and empirical approaches.”
— Diego Fazi
be extremely rewarding since toxicology “is constantly evolving to emphasize a broader range of sub-specialties in molecular biology,” he notes. “It needs emissaries from these different fields to work together to find novel and creative ways to answer critical and pressing questions in the field. This need has created opportunities for someone like me, to apply my skills in epigenetics and molecular biology to solving the next generation of problems facing this field.”

**Noting differences between fields**

As you adjust to a new discipline, there are many challenges to be met. One major difference in any new field is how the experts think about problem-solving. Each field has its own research approaches, which you have to learn quickly when transitioning areas. This requires an abundance of reading papers, speaking with experts, learning techniques, and shadowing colleagues. “The first few months into my postdoc, the only thing I wanted to do was sleep, because it was so much to learn and incredibly mentally exhausting,” says Elizabeth George, a postdoc at the Max Planck Institute for Extraterrestrial Physics near Munich, Germany, who migrated from cosmology with the cosmic microwave background (CMB) to infrared astronomy.

The cultural differences between disciplines can be surprising, even if the science seems to overlap. George’s culture shock manifested as she realized the different approaches to solving scientific problems in astro-physics versus astronomy. “Infrared astronomy is much more traditional astronomy, where you look at objects and try to understand what you are seeing,” she says. “But in CMB cosmology, you start with a model of the universe and only measure one thing—the cosmic microwave background radiation—and try to fit your data to the model.”

In making her transition, Patterson noticed a difference in how data itself is perceived and handled in different subjects. Astronomers are very open with their results, and since astronomical data is shared often, it has a uniform format, no matter the source. But in medicine, the tables are completely turned: data is sensitive and since it is drawn from medical records, there is much more concern over who has access to what. Additionally, “people don’t want to share their data as much, because it is valuable for commercial purposes,” she notes.

Moving from a lab-based science to one that involves patients requires nimbleness and flexibility. “I had never worked with humans before,” says McCullough. “As a molecular biologist, I worked with cells in a dish. They didn’t talk, and they didn’t have to be informed” about the nature and risks of the studies. But in investigating how environmental factors contribute to disease, he had to learn a new protocol and ensure that the subjects understood everything that was taking place. When Ewan Cameron, an astronomer-turned-epidemiologist, “jumped ship” (as he puts it) to become a senior computational statis...
Day-to-day differences can also pop up, especially for those who switch from theoretical to experimental fields. Both Erez and Fazi had never done wet lab work. “Before I came here, I was a theorist with clean hands,” says Erez. Adds Fazi: “I had to learn basic chemical techniques, such as making a solution and setting up an experimental apparatus.”

And of course, “when you switch fields, you incur a time penalty,” notes Erez, “It takes time to settle into a new field,” to learn its nuances and then be able to be productive enough to publish. Adds George: “Changing disciplines feels like you are starting grad school all over again, except that you are a much better learner.” It took her 6 months to “start feeling productive, and to be able to begin asking questions that pushed knowledge forward and were as useful to my colleagues as they were to me.” Erez recommends giving yourself a break as you ramp up your knowledge. “Don’t expect to be as productive in your first year as you would have if you stayed in the same field,” he says.

Making the switch

Whether your switch seems radically different, like physics to immunology, or something seemingly more related, like astrophysics to astronomy, it is important to be ready to market your talents and show what you can offer a new field based on your background. This is especially crucial given the fact that as you transition, you are not necessarily going to be acknowledged for your research reputation, as George discovered as she plotted her move. “In my new discipline, I am a completely unknown quantity. People haven’t read my papers,” she says. To land a postdoc, she pitched her PI that her experience in building and deploying astronomical instruments, unusual for an astrophysicist, could serve as an asset for the new research group.

“Start as early as possible in your planning,” says Erez. Many scientists who change fields launch their career plan in grad school. For example, Patterson took classes in Python and programming. Erez attended biophysics talks at physics conferences as well as on his campus, and engrossed himself in papers and books that focused on his newfound subject.

Your grad school mentor might be helpful too, if you can present your switch as an advantage to them to advance their own research interests. In doing so, “you might find that your advisor is inclined to send you to a conference in the field you are interested in,” says Eric Brown, acting deputy division leader of the Materials Science and Technology Division at Los Alamos National Laboratory, whose doctorate is in physics. Furthermore, he recommends leveraging the resources offered by the professional association of your new field. “Many science societies issue reports on demographics, career paths, and employment statistics,” he says, which can be invaluable in the career planning process.

As you transition, you have to establish a connection between your past and your desired future. “Those bridges, of taking what you learned from one area and applying it to another, need to be visible,” says Jason Cooley, who switched from biology to biochemistry and then eventually found his way to the chemistry department of the University of Missouri as a solution to his own two-body problem. He equates it to telling a story with a narrative that explains the natural progression of how you got to where you are today. Without it, “people will think that if you get bored, you will jump somewhere else,” he adds. In George’s case, her narrative showcased her desire to build high-quality scientific instruments, which she had demonstrated as a grad student and which she planned to do as a postdoc.

No matter your story, your publications are your “scientific currency”, so “before you move, write a paper that relates, even in a tangential way, to your future field,” urges Joel Cavallo, a postdoc in psychiatry with a dual appointment as a fellow in the Program of Clinical Pharmacology and Pharmacogenomics at the University of Chicago. As he completed grad school in neuroscience and psychology, Cavallo authored an article on the erasure of associative memories in a sea slug. Because maladaptive learning and associative memories can play a role in mental disorders, this work helped show his dedication to his desired discipline of psychiatry.

Getting the appointment

It’s not surprising that, despite your best intentions, it can be difficult to change fields, especially right after grad school. “It wasn’t easy to get a postdoc because most biologist PIs wanted someone with experience in biology,” admits Erez. He was lucky to have found a mentor who appreciated his background in physical science and had experienced a similar transition into the field. “I needed a PI who had a good background in biophysics because otherwise it would be very difficult to communicate, since I didn’t speak the language of biology and he wouldn’t have spoken the language of physics.”

But as more STEM fields become interdisciplinary, sources say that there will be growing opportunities for innovators who can understand and unite multiple universes. Brown notes that it is becoming more common for early career scientists to switch subjects between the Ph.D. and postdoc, as “it’s an opportunity to jump into something that is new and fresh and exciting,” he says. And having the capacity to connect seemingly disparate fields can hold other advantages. Indeed, Fazi, who recently leveraged his postdoc into a full time position at ANL as a technology innovation strategist with a focus on green tech, says that changing course for him “gave me more perspective in science,” he says. “I came out a more complete scientist with more cards to play.”

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— Jason Cooley
From the lab to the clinic and back: Translational research training and careers

By Chris Tachibana  |  May 2011

Translational research programs bring together physicians, bench scientists, bioengineers, epidemiologists, patient experts, and more. The goal is learning to communicate across disciplines to achieve advances in health care.

“The way I treat cancer today is completely different from 10 years ago because of translational research,” says Mary (Nora) Disis, oncologist and principal investigator of the Institute of Translational Health Sciences at the University of Washington. Look at drugs like Gleevec, Avastin, and Herceptin, she says. All are examples of translational researchers converting molecular knowledge about specific cancer cells into effective, targeted therapies.

Efficient movement of basic science knowledge about specific cancer cells into effective, targeted therapies is the goal of translational—often described as “bench to bedside” work—is the goal of translational research. Disis thinks the field is so promising she hopes her kids grow up to work in it.

Fluent in many languages, comfortable in many cultures

Future translational researchers of all ages must be adaptable, life-long learners, says Disis. “They have to be highly curious about a lot of different things, collecting data and ideas from the basic literature and creatively applying these to disease solutions. This means being outside your comfort zone, reading literature that is way outside your field.”

“Translating” is exactly what these scientists do—taking information from one domain and expressing it in another, and communicating daily with people who speak different scientific languages: laboratory scientists, clinicians, patient and regulatory experts, biostatisticians, epidemiologists, and patients.

A translational scientist should be able to move an idea all the way from basic research to a clinical application and back to the lab to inform more basic science. Handing off projects from one expert to another doesn’t work, says Disis. Success requires someone who understands the idea intimately, and who can build a multidisciplinary team to guide it along the translational path.

It’s a long journey with physical hurdles, since basic and clinical research labs usually reside in separate departments. There are also intellectual and cultural barriers. Basic science starts with a hypothesis and designs experiments that validate or reject it, with the goal of acquiring knowledge. Translational science starts with a health need and looks for scientific insights or tools to address that need. Its goal is improving health, explains Barry Coller, vice president for medical affairs and physician-in-chief at Rockefeller University, in a 2008 Mount Sinai Journal of Medicine article. The successful translational researcher needs to be comfortable in both of these cultures, be fluent in many fields, and thrive on collaboration.

For those with medical training, this might mean learning about hypothesis-driven science and designing experiments and assays. For those with a research background, it could mean learning clinical study design and the bioethics of human research. In either case, the goal is becoming competent to interpret, evaluate, and discuss different types of research, rather than conducting it all yourself, says Doris Rubio, professor of medicine, biostatistics, nursing, and clinical and translational science at the University of Pittsburgh. In her translational science training program, she says, “I have a bioengineer who can now design a clinical trial. I love that he can do that, and he says it gives him a deeper understanding of his own research.” Formalized training is important because translational science is so complex and getting exposure to all the elements is difficult outside of a specific program, says Rubio.

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— Doris Rubio

Being a multidisciplinary team player

Training options include a Ph.D., Master’s degree, or certificate in translational science. For those who already have an M.D. or Ph.D., career development awards can provide support during the training period. Classes explain the basics of study design and methods, biostatistics, and bioethics. Because developing a new drug, device, or procedure is a team project, coursework might include team dynamics and management. However, for most trainees, the most valuable...
aspects of a training program are mentoring and hands-on experience in multidisciplinary research.

In the United States, most training opportunities are through the Clinical and Translational Science Awards (CTSA), which were launched in 2006 based on the 2003 National Institutes of Health (NIH) Roadmap for Medical Research. This set of guidelines encourages cross-disciplinary, team-based research as a way to overcome obstacles to turning scientific discoveries into health solutions. Currently, CTSAs have been granted to 55 institutions, with a plan to fund 60 institutions by 2012. The goal is to fund the consortium of award recipients with approximately $500 million annually. The NIH continues to promote translational research with the creation of the National Center for Advancing Translational Sciences (NCATS) as a “bold, new, focused center systematically engineered to accelerate translation.” The CTSAs will be the cornerstone of the NCATS. However, NCATS has been controversial for the speed at which the center is being created and the effect of reorganization on aspects of a training program.

The Howard Hughes Medical Institute also funds translational science training through its Med into Grad Initiative, which has awarded various institutions a total of $16 million as of 2010. The programs introduce elements of clinical training into basic science graduate work. They vary by institute, but range from Ph.D. programs in translational research to mentoring opportunities that pair graduate students with a physician advisor.

M.D.-Ph.D. degrees train individuals in clinical and basic research, but translational research programs strive to integrate these two sides of medical science by connecting people and building networks. Liz Broussard is a gastroenterologist who is finishing a University of Washington Institute of Translational Health Sciences training program. “There’s absolutely no way a junior researcher could launch a translational research career without this training,” she says, pointing out the benefits of everyday experience in a multidisciplinary team of scholars. “My first year, we had a psychiatrist, a surgeon, a social worker, a cardiologist, and a pharmacist in the program.” A particularly useful activity, she says, is weekly discussions of project ideas and works in progress. These are guided by senior faculty, who also give advice on “their career trajectory, resources, funding mechanisms, partnerships that were successful—essentially life experience, and teaching us how to succeed in research.” For a physician, Broussard said the value of a training program is lessons in research methods and thinking scientifically, and learning to ask whether the story in your project and funding application makes sense and has logically supported specific aims.

For a bench scientist, a background in translational research turns the medical objective that is often written into a grant application into a real and achievable goal. Ian Lanza earned a Ph.D. in kinesiology, and is now a senior research fellow in the Mayo Clinic CTSA Mentored Career Development Program. This gives him both a postdoctoral research opportunity and guidance towards his long-term goal: “That my research has a high impact on public health.” Lanza’s project involves collaborating with an endocrinologist and a radiologist, and he says, “It has been very seamless working with both, with a lot of collegiality between the departments.” In fact, one way that translational science programs integrate disciplines is to have students and young investigators act as liaisons between senior faculty in different departments. In turn, says Lanza, trainees benefit from having established clinical researchers as mentors and from working with experienced investigators from several disciplines. Lanza’s project illustrates another aspect of translational research: It’s not always about designing the next cancer drug. It can be traditional bench work with an eye toward how the results might be applied to everyday health care. Lanza is not currently planning any clinical trials for his work on muscle mitochondrial physiology and function, but looking ahead, says, “I hope to provide some concrete recommendations for cost-effective, straightforward lifestyle choices that can preserve quality-of-life as people get older, not necessarily increasing their lifespan, but their health span.”

To get a sense of the variety and diversity of translational research and the educational options, look through the online offerings hosted by each CTSA-funded site. Depending on the institution, these include online case studies, podcasts and webcasts of seminars, and continuing medical education courses on topics such as statistical methods, or engaging the community in research. These web-based resources also extend the network of translational research into the global scientific community.

International and interdisciplinary

Translational research is not just multidisciplinary, it’s multinational. “Translational research is an emerging field in China,” says Depei Liu, president and professor of the Chinese Academy of Medical Sciences and Peking Union Medical College in Beijing. “For now there are no classes called ‘translational research,’ although related skills and
experience are widely taught.” Formal training includes an option at some medical schools including Peking Union Medical College that provides eight months of research training after the clinical program. Another program allows qualified medical school graduates to earn a Master’s degree in a basic research field. Informally, “doctors are encouraged to do basic research, to apply for funding and to publish papers and collaborate with specialists in genetics and molecular biology, and doctors and basic researchers often hold meetings together. In addition, there are many short courses and training programs in the fields of basic research and clinical research,” says Liu. Translational research centers have been established in major research cities, he says, for example the SIBS-Novo Nordisk Translational Research Center for Pre-Diabetes in Shanghai. Current government support includes Chinese National Science Foundation funding for applied medical research, broad support for science and technology projects from the National Basic Research (973) Program, and Science and Technology Special Projects support for basic research in drug discovery and infectious disease.

In Europe, one opportunity for translational research training is the Marie Curie Actions, part of the European Union (EU) Seventh Framework Programme for Research and Technological Development. Project support is available at the doctoral, postdoctoral, and career development level as well as for partnerships between industry and academia and for multisite studies. In keeping with the translational science goals of building networks, collaborations between countries are a focus, as is researcher mobility from one EU country to another. The budget for translational health research since 2007 has been 12 million euros, representing 3% of health research training programs for the Marie Curie Actions. According to Georges Bingen, the European Commission’s head of unit for the Marie Curie Actions People Programme.

In the United Kingdom, another stakeholder—the pharmaceutical industry—is involved in translational science training. The Translational Medicine and Therapeutics Programmes were established two years ago at University of Cambridge, University of Newcastle, Imperial College London, and a consortium of Scottish institutions. Funding is in the form of 11 million pounds from the Wellcome Trust, a London-based foundation that supports research on animal and human health, and contributions to individual institutions from companies such as GlaxoSmithKline, Pfizer, Roche, AstraZeneca, Sanofi-Aventis, Sirtris Pharmaceuticals, and PTC Therapeutics. “We recognized a need to train a new type of researcher who is comfortable in the creative space between academics and pharma,” says John Williams, head of clinical activities and head of neuroscience and mental health for the Wellcome Trust. “To do this, we partnered institutions with high-quality academics and health care facilities with world-class pharmaceutical companies.” Training programs can be individualized, but usually guide physicians through a Ph.D. project with an emphasis on teamwork, group support, and mentoring. Currently, 6 to 10 fellowships are awarded per year. Bidirectional communication between the lab and the clinic is facilitated by physical proximity. “We’ve embedded clinical researchers and facilities in academic hospitals, with close links to the research environment around them, including access to technology for ‘omics and imaging,” says Williams. “This allows subject phenotyping and tissue sampling to be brought into research labs to do the high-technology work that reflects today’s bioscience.”

Regardless of the geographic setting, the goals and challenges of translational research are the same, says Liu: Getting funding and infrastructure support from the government, training young investigators, creating a multidisciplinary community of researchers who can effectively communicate with each other, and finding ways to systematically implement translational research results into clinical practice.

A growing field in a shifting background

Scientists beginning a career in translational science also need to consider the changing emphasis of medical research, particularly in the United States, where health care reform is currently under way. Doris Rubio says, “we’re seeing a shift to personalized medicine and medicine that’s more evidence-based. The field is also expanding into patient-centered outcomes research, so not just comparing drug A with a placebo, but drug A versus drug B.” In spite of the uncertainties, she says, “It’s an exciting time because we have a lot to learn.”

Changes in the business sector also affect the translational researcher. John Williams of the Wellcome Trust says, “Pharma is looking to change its discovery models, and as painful as that retraining may be, it creates wonderful opportunities in the space between pharma and academia. We hope it will inspire the most creative minds to participate in this exciting time in biomedical and translational research.”

Even in the changing health research landscape, postdoctoral fellow Ian Lanza is positive about his career path. He sees the field as growing, and feels that the NIH generally supports young investigators. Gastroenterologist Liz Broussard says although she could make five times as much money in clinical practice, this would probably mean “doing colonoscopies eight hours a day,” and she finds her work on a colon cancer vaccine much more inspiring. “I enjoy the clinical work I do now,” she says, “but ultimately, translational research can affect patients by changing the current standard of care. I am optimistic about it because I can see myself doing a small part to advance science. It’s exciting and, despite funding woes, that keeps me going.”

“Translational research can affect patients by changing the current standard of care.” — Liz Broussard
High technology permeates every corner of every enterprise, from global computing corporations, to social media and search establishments, to retail giants. Not surprisingly, these industries offer attractive playgrounds for Ph.D.-level scientists and engineers.

Almost every moment of our day is somehow touched by high technology. Whether you are searching for an old friend or buying coffee on the Internet, billions of lines of code, petabytes of data, and a potentially infinite amount of brain power make it possible. And behind every invention are scientists and engineers. As more industries are influenced by big data and computer-based systems, the need for talented Ph.D.-level science, technology, engineering, and mathematics (STEM) professionals to contribute to these arenas has grown considerably.

High tech jobs are exciting and diverse: The problems they address are interesting and intense, involve multifunctional (and in many cases, multinational) teams, and offer the chance to make a difference that is felt by customers the world over. As Nicholas Clinton, a developer advocate at Google with a Ph.D. in environmental science, policy, and management, says: “It’s great to feel like I’m part of something impactful, with real power to effect global-scale change.”

As a member of the developer relations team for Google Earth Engine, a platform for Earth science analysis, Clinton strives to ensure that external developers are able to utilize the instrument effectively. He collaborates with the Earth Engine engineering team to help them identify user needs and to improve the platform. “I conduct a lot of trainings, give a lot of lectures, and create documentation to enable users to do incredible things,” he says. “I ensure that researchers can use Earth Engine to perform high-impact, data-driven science.”

Sun Mi Chung, a Ph.D. astrophysicist and principal data scientist at AOL, also appreciates how rapidly her work affects the public. In her job, she applies machine learning techniques to optimize real-time bidding for advertisements on the AOL platform. “We have to think deeply about what makes sense in terms of the algorithms we use and whether we can put it into production quickly,” she says.

Chandra Narayanan’s doctorate is in oceanography, and as director of data science for Facebook, he has engaged with almost every product in the company. With a background in creating numerical models for Earth systems, he was working for the National Weather Service when he heard that a new group was forming at PayPal that was eventually to become one of the first data science groups in industry. Narayanan came on board at PayPal in 2007, where his responsibilities included risk analytics and fraud identification.

His entry into Facebook in 2010 was facilitated by a former colleague. He initially joined the social network in its risk management practice, but every few months, “I took on a new portfolio,” says Narayanan. His accomplishments include building from scratch the teams that focus on Instagram, games, risk, payments, and advertisements. But he is most proud of his ability “to be able to chart a new course for what data science means in industry,” he says. “Many companies are using Facebook as their model to form data science teams.”

Investigating the diversity of destinations

Not surprisingly, data science careers are particularly prominent in the high tech space. David Evans is a computational linguist with a Ph.D. in computer science from Columbia University. He is also passionate about Japanese language and culture and had studied it since he was an undergraduate. An internship at IBM Japan while in grad school solidified his interest to work.
in that country and combine his two loves. While pursuing a postdoc at the National Institute of Informatics in Tokyo, Japan, an Amazon recruiter contacted him about an opening related to information retrieval and searching. The company needed someone who had both data analytic skills and a prowess in Japanese linguistics. “Because Japanese and English are so different, there are very different ways of searching for information in those languages,” says Evans. Given his research in information retrieval and the fact that he was bilingual, “it made sense for me to go to Amazon,” he says, and today he is a senior search engineer working for A9, a wholly owned subsidiary of Amazon Japan.

With data being utilized in increasingly new and creative ways, the diversity of career paths in high tech companies has increased, especially in multinational firms like IBM. Kristen Beck and Temitope A. Ogunyoku are both IBM employees and scientists who hold a Ph.D.—Beck’s doctorate is in biochemistry, molecular, cellular, and developmental biology, and Ogunyoku's is in civil and environmental engineering. Their jobs and career paths are very different and are on opposite ends of the planet. And neither of them do what one might expect at the opposite ends of the planet. Beck, who is based at IBM Almaden Research Center in Silicon Valley, works on bioinformatics problems in association with the University of California, Davis and Mars, Incorporated. She is examining ways in which analytics can be applied to food safety on various fronts, including pathogen detection, antibiotic resistance, and food fraud or mislabeling. She leverages her biology background to implement solutions based on life science tools, such as next-generation sequencing.

Ogunyoku is a research scientist with IBM Research–Africa in Nairobi, Kenya, one of only 12 global research labs in IBM’s portfolio, where “I address grand challenges in Africa and develop solutions that affect people’s lives,” she says. Her focus is on creatively utilizing analytics to scrutinize complex interconnected datasets and deploy solutions in fields such as public safety and waste management. For example, her team monitored social media in Kenya for data about crime, because people use it as a platform to report public safety concerns. “We used algorithms and natural language processing systems to detect and determine the credibility of these incidences,” she explains, adding that the goal of this research was to develop a product that can be used by security companies to alert their clients of criminal activity.

Searching for an “in”

At Facebook, there are multiple entry points for Ph.D.-level scientists and engineers interested in joining the company. Your doctorate gives you access to jobs in product management, engineering, design, analytics, user experience research, and even marketing and sales, says Narayanan. The key to employment? “Love the mission, be quantitative, be interested in solving hard problems and building awesome products,” he stresses. As the head of recruitment for analytics, he looks for candidates who display a “ton of curiosity, drive and leadership, have a highly analytic nature, enjoy a fast-paced environment,” and of course have superior coding skills. Interestingly, new employees in Facebook’s analytics department come in through a central pool, and after a five-week boot camp and orientation, can pick which group they want to work with.

Similarly, at Amazon, Ph.D. scientists are recruited for their technical expertise, and “you get to come in and look for a way to apply your work,” says Evans. “Your career is up to you. Amazon matches capabilities to interests and interests to projects.” For his team, he looks for professionals with a background in machine learning, computational linguistics, and information retrieval. But the key to getting a job, especially in software development and analytics, is to clarify “how what you are doing now can be applied to products [and systems] at the company,” he adds. That’s essentially how Clinton landed a position at Google. “The more you can demonstrate how Google can leverage your research and development work to achieve amazing, broadly applicable results, the better [your chances for getting a job],” adds Clinton.

In smaller organizations and start-ups, the hiring process tends to focus on immediate needs, as dictated by the business plan. When Kamal Jain, CEO and founder of Faira, a technology company for real estate, recruits, he looks for people with skills that match the task to be done. Radu Rusu, CEO and cofounder of Fyusion, a startup

Your doctorate gives you access to jobs in product management, engineering, design, analytics, user experience research, and even marketing and sales.
Looking to reinvent the use of 3D imaging for consumer applications, pores over publications to find “research results that match our roadmap,” he says. But he also keeps an eye out for scientists who possess honesty, humility, and flexibility, a marker of their potential to prosper in his organization.

“If you pick opportunities that align with your passion, that will help you be successful, you’ll feel like you are part of the larger picture, and it allows you to be an ambassador for the cause of your choosing.”
—Kristen Beck

Navigating a new culture
As you transition into high tech, it is important to recognize the variances in culture among these types of companies, as compared to other sectors. One of the features of Google’s culture that Clinton immediately noticed is its emphasis on teams, which takes a different approach than what is usually found in universities. “The team environment is a big change from academia, where you work in collaborations, but a lot of time is spent on independent study,” he says. At Google, “you need very tight teamwork, timing, communication, and camaraderie to compete successfully.”

At FICO, the financial services company, teams are always interdisciplinary, says Scott Zoldi, chief analytics officer, who holds a doctorate in physics. “You have to be a good listener and a good collaborator,” he says. “It’s a rich environment, where different points of view are not just welcome—they’re expected. It’s not going to be one Ph.D. scientist solving the problem, but rather a group of people, from many different fields, working together.”

As Narayanan made his way through PayPal and Facebook, he was intrigued by how much his scientific skills easily transferred to the high tech industry. As an oceanographer, he was used to applying models to understand processes associated with natural phenomena. At PayPal and Facebook, he tapped into the same set of abilities. “It was easy to jump in. In fact it was seamless,” he says. “Being able to analyze data, recognize patterns, summarize results, break down problems in the simplest way—these are the kinds of things I learned prior to joining industry.”

Evans notes that the culture of Amazon encourages employees to identify ways to improve the company, whether or not that improvement is related to their job function. “We have the responsibility. We can take a real ownership of a problem,” he says. This translates to an ecosystem where individuals have a large amount of influence and freedom. One of the main projects he’s worked on had little to do with search capabilities, says Michael Li, whose Ph.D. is in mathematics. He worked for Intel, Google, Foursquare, and JPMorgan Chase before launching the Data Incubator, which trains STEM Ph.D.’s for data science careers. He emphasizes that technical know-how is what hiring managers crave. “No one needs just an ‘ideas’ person. They need someone who can actually get the job done.”

“The people who are the most successful, marketable, and valuable do their job and also understand the broader picture,” says John Heinlein, vice president of marketing for ARM, a global designer of semiconductor intellectual property, whose Ph.D. is in electrical engineering. “They don’t stay in silos. You might never change your role, but you’ll do a better job if you understand what’s happening to the right, left, up, and down in the organization.”

Advancing your career into new realms
One aspect of high tech companies that is especially attractive to Ph.D. scientists and engineers is the flexibility to determine your own career path. The competition for top talent is fierce, and firms want to retain the brightest minds. So they offer their employees wiggle room to design their own career advancement strategy. For example, it is not uncommon to find lateral moves encouraged.

At Amazon, “I could move back to the States and still remain with my current team,” says Evans of his career options in the future. Adds Ogunyoku: “At IBM, you are able to reinvent yourself. I can go work for the design team or a global business unit, [among other choices]. Having a Ph.D. doesn’t limit me to only research and development.”

With this level of latitude across the high tech arena, job prospects and career decisions may seem overly complex. But there is a simple way to determine your next course of action in crafting a career there: Articulate your own values. “If you pick opportunities that align with your passion, that will help you be successful,” says Beck. “You’ll feel like you are part of the larger picture, and it allows you to be an ambassador for the cause of your choosing.”
Building a relationship with your boss that allows for mutual benefit.

This idea turns out to be one of those rare areas of concordance between industry and academia because the boss-subordinate relationship is so important in both contexts. After discussing this topic with postdocs and principal investigators at a recent Career Day I attended, I came to believe that, if you composed a list of the toughest bosses in the world, at least half of them would be in academia. That makes the university just the place to start sharpening your managing up skills.

Kissing up or good career strategy?

In the book, Jones describes managing up as a series of behaviors that are much like any other form of leadership, but instead of leading subordinates, you are doing your best to eliminate obstacles placed in front of you by those who are higher up. By helping them move their agendas forward, benefits accrue that have the downstream effect of making your own goals more accessible.

But wait a minute—is this starting to sound a bit too much like that obnoxious character you knew as the brown-noser from your first lab, the one who would do anything to ensure that he was in the boss’s good graces? No, that’s not what Jones would suggest, nor would I. Often it’s a matter of subtlety, and it all boils down to intention. If your intent is to have praise showered on you, then you’ll be crossing that brown-nosing line and quickly earn the wrong kind of reputation. But when managed correctly, your actions to help those higher up will very directly influence your own progress in a positive way.

Here are five of Jones’s suggestions for managing up, adapted to a scientific career.

1. Set unselfish goals. Managing up does not mean trying to manipulate people or creating situations that put a win in your corner. Focus on the greater good—what’s good for the lab as a whole—not what’s best for you. Managing up could include offering proposals that will increase the lab’s visibility or bring benefits to the entire team. Achieving this mindset requires, as Jones writes, a sense of “authentic humility.” And remember that, by helping your boss and the team, you will ultimately be helping yourself as well, for example, by improving the culture of your working environment.

2. Understand what your boss, department, and institution need. Look closely at your institution’s plans and biggest investments, and think about how your boss and your department fit into those plans. Look for every opportunity to develop ideas that will con-
Choosing the right approach

Managing up is a highly customized process which requires that you know something about your boss. You can’t start managing up from the first day in the lab as a new postdoc; you’ll have to watch, listen, and learn before knowing anything at all about that person’s style.

One area that illustrates this principle is communication, which is a crucial component of managing up effectively. Ordinarily, communication is an exchange that requires both parties to participate toward a successful outcome. If you and I sat down to talk over a cup of coffee, it would be my responsibility as much as yours to ensure that our exchange works out well. Unfortunately, it doesn’t always work this way when you are dealing with bosses. Simply because of their status on the prestige totem pole, they don’t have to follow the same rules.

In communicating with everyone else, you lay out your message and—hopefully—listen well to theirs. But with the boss, you’ll need to pay close attention to her preferred communication style and adapt as needed. Does she prefer direct communication, where you come right to the point and spit it out all in 1 minute or less, or does she prefer an ice-breaking exchange before getting down to business? Everyone is different, and your input will be better received if you fine-tune your communication to match your boss’s preferred mode.

Regardless of the boss’s style, Jones suggests that you be brief. “Be succinct,” she writes. “Assume your boss is busy and won’t want to waste time. If you ask for three minutes to discuss something important but then talk for 10 before reaching your point, the boss could be feeling impatient or annoyed by the time you make your case.” To avoid this uncomfortable situation, she continues, “[p]lan ahead. Before your conversation, be clear in your mind about your points, and be prepared to state them simply and directly.”

From my own past experience, I know that it can be a real temptation to overload a conversation with too many topics. In most cases, you don’t get a meeting with the boss all that often, so you want to make it count and squeeze in every detail you’ve been thinking about. But the key is to prioritize. Do the best you can to limit the number of items in the conversation. If you try to discuss more than three or four points, you run the risk of wearing out your welcome. Nothing strikes more fear in my heart than a boss who is looking at his watch when I am trying to make an important point!

Lastly, there’s one thing almost universally true about managing up. Bosses don’t like it when you come in and rattle off problems without having a suggested course of action to go along with them. “Bring me solutions, not just problems,” is the way my first boss described it. That’s right—you may be in front of the boss to get her to resolve an important question, but you’ll still need to suggest your own course of action. She may not take your suggestion—don’t be offended if that’s the case—but with time you’ll gain respect for being proactive and creative in addressing issues that arise. And that first time the boss agrees with you, it will feel mighty good.

Some bosses will lap up the compliments and eager coffee runs of those who intend to follow a kissing-up strategy. That’s not you. Regardless the size of your boss’s ego, she or he will have a genuine need for a person on their team who thinks about wins on a grander scale than the selfish view of a brown-noser!

“Before your conversation with your boss, be clear in your mind about your points, and be prepared to state them simply and directly.” — Beverly E. Jones

4. Be gracious in managing credit and blame. As Jones writes, “credit is a vast resource to be spread around, not hoarded.” Share the credit wisely and you’ll avoid a reputation as a kiss-up. Similarly, take more than your share of the blame when it goes around. Be the one who accepts blame and quickly turns toward solutions and you will earn respect and trust.

5. Report without drama. There’s already lots of drama in the average laboratory—avoid doing anything to add to it. Be the one who can bring the boss solutions without inserting any unnecessary intensity. Avoid exaggeration, gossip, and negativity. Instead, gain the reputation of being direct yet tactful. Don’t be the one who tells the boss what she wants to hear, but aim to be the one who brings accurate portrayals of problems along with positive recommendations for moving forward.

One area that illustrates this principle is communication, which is a crucial component of managing up effectively.
I t all started a couple of years ago, with a mid-career crisis shortly after the relief of obtaining academic tenure. I was successful by the traditional metrics of academia—publishing papers, procuring grants, training students—but I no longer felt like that was enough. I wanted my work to make a positive difference in the world, but I didn’t really know how to make that happen. If you had found yourself sitting next to me on a plane and asked me why taxpayers should be funding my research into soil microbes that do important things like clean our water and recycle plant nutrients, I would have given you a finely crafted answer about how my work helps better predict carbon cycling and informs policy. But the truth, I felt, was that it was several steps removed from making a tangible difference.

Upon realizing that I wanted to do more applied work, I found the starting point in one of my existing projects: studying how microbes affect plant growth and tolerance to stressors like drought. With one of my postdocs, Colin Bell, I began to explore the possibility of developing beneficial bacteria to help produce more food with less environmental impact. We decided to work on bacteria that solubilize phosphorus, making it more available to plants and thereby supporting their growth. Within just a few months, we had developed a combination of four bacteria that were 30 times better than the average soil bacteria community at making phosphorus available.

With this preliminary data in hand, we started thinking about how we might translate this finding into a product that others could use. We were drawn to the idea of starting our own company. I had always been interested in entrepreneurship—as a high schooler I started landscaping and auto detailing companies and won a statewide entrepreneurship competition—but I had little idea how to launch a startup. So, in the early summer of 2014, Colin and I applied for the National Science Foundation (NSF) Innovation Corps (I-Corps) Teams Program, an intensive 10-week program with 6 months of grant funding to identify and explore potential business opportunities for technologies developed with NSF support. I’ll never forget the rapid-fire conference-call interview with the selection panel, akin to the grilling that contestants experience on the TV show Shark Tank, which tested our motivation, commitment, and aptitude. We passed the test, and I was thrilled and eager to dive into this new and relatively unfamiliar world of startup companies.

It seemed like we might be off to a rough start when we had our first conversations with real potential customers during the program’s 3-day kickoff workshop. To our disappointment, when we asked farmers to tell us about the challenges they faced, not one mentioned phosphorus. It seemed that we were trying to solve a problem that they didn’t care about! Apparently they hadn’t read the same high-profile research papers that I had read about the impending phosphorus crisis. Colin and I spent the next 2 months exploring other potential markets for our beneficial bacteria by interviewing more farmers during the program’s 3-day kickoff workshop. To our disappointment, when we asked farmers to tell us about the challenges they faced, not one mentioned phosphorus. It seemed that we were trying to solve a problem that they didn’t care about! Apparently they hadn’t read the same high-profile research papers that I had read about the impending phosphorus crisis.

By the end of the 10 weeks, we had identified a strong product-market fit by focusing on what our product does—increase yields—rather than how it works, and we began the hard work of creating and funding a company. After further development in a startup accelerator program, we successfully raised venture capital funding and launched our company, Growcentia, Inc., in March 2015. Less than 6 months later, we began producing and selling microbes based on those we had developed in our university laboratory. It has been incredibly rewarding to make something others could use. For me, it has been even better than the satisfaction of getting a

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— Matthew Wallenstein

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Building bridges between business and academia

After helping to launch Growcentia, I wanted to continue finding new ways to increase the impact of my academic work. I also thought I could bring valuable insights from my I-Corps training and subsequent startup experience to my academic colleagues who also wanted to make a difference but weren’t accustomed to thinking about their work from a business perspective. In early 2015, I began working with a group of my fellow Colorado State University faculty members and led the development of the CSU Innovation Center for Sustainable Agriculture, which aims to increase crop productivity while decreasing environmental impacts of agriculture. The typical academic approach to solving this type of problem would be to build on our previous work to iteratively improve our basic knowledge, and then figure out how to communicate that knowledge to others who might use it to develop products or policies. Although this approach is the cornerstone of scientific progress, it often leads to creating solutions that are completely impractical or that address problems people don’t really care about, as Colin and I discovered in our early phosphorus-solubilizing project.

Instead, I convinced my colleagues that we needed to work backward, first identifying the biggest challenges that farmers and agricultural companies were facing in implementing sustainable agriculture and then designing projects to solve those problems. My colleagues were somewhat apprehensive about this new approach, but many were surprisingly open to it because they too recognized the need to try something different. Thus, we set out to interview farmers, companies, nongovernmental organizations, and other academics to understand how they were addressing sustainability, just as I had recently done for Growcentia.

One of our first “aha” moments came during a conversation with a major agricultural company. We met with a staff scientist the company had tasked with initiating a new program in soil health, but nobody at the company even knew how to define soil health, never mind how to improve it. Here was a problem we academics could help solve by translating fundamental scientific research into an actionable management program to improve soil health. We would never have identified this opportunity to apply our expertise if we hadn’t proactively engaged in customer interviews.

As we continued to learn about how companies were addressing sustainability and where they were struggling, we began to better understand what we could contribute, but we also found that we needed a way to organize our insights. So, at a 2-day retreat this past August, with help from a business consultant, I introduced our team to the “business model canvas” that I had learned through I-Corps. The canvas is a piece of butcher paper taped to a wall, divided into sections with labels like “value proposition” and “customer archetypes,” which we would cover with color-coded Post-its to brainstorm and organize our thoughts. My colleagues awkwardly tried out this new vocabulary, but many were surprisingly open to it because they too recognized the need to try something different.

Over the last year, I’ve talked to many academics who want to direct their research toward solving big real-world problems but don’t know where to start. They often have novel insights and ambitious visions but lack a rigorous process. I have found that the startup world offers some valuable approaches for academics striving to increase the impact of their work, and over the next few years, I aim to help bring some of these approaches to academics through workshops and other media. In business terms, I want to develop a scalable model to help academics maximize their returns on society’s investment in our education, infrastructure, and research. I still have a lot to learn. I live in two different worlds right now, and the startup world is on a different space-time continuum than the academic world, but I think it has a lot to offer. And I believe I can help by bringing those worlds closer together.
Building a balanced scientist

By Trisha Gura | January 2016

When Srinivas Tadigadapa embarked on his research training in the 1990s, he imagined becoming a professor of engineering. But after 7 years as a graduate student and postdoc in academic labs, he felt like he wanted to explore “the other side,” so he took a post—and a gamble—at a startup company called Integrated Sensing Systems, Inc. (ISS) in Ypsilanti, Michigan. To his surprise, it was “an outrageously exciting experience,” he recalls. He developed pressure and flow sensors for the semiconductor industry, making use of his research background in microelectromechanical systems (MEMS), and he gained experience in business. He also sees the writing on the academic wall. “There is a massive emphasis on academic and industry partnership, both from funding agencies and lawmakers,” he says. “They’re asking, ‘At the end of the day, where does this [basic] research create jobs?’”

To answer, Tadigadapa has decided to try a yearlong sabbatical at a company, which he plans to use as a springboard to forge a long-term collaboration. He began this stint last fall at MKS Instruments, a midsized sensor and instrumentation company north of Boston.

Tadigadapa’s is one of many strategies being adopted by a niche group of researchers who have positioned themselves at the nexus of academia and industry. Some work through collaboration, straddling the divide. Others embark on joint postdocs to gain skills from both spheres so that they can better translate basic research to a final product or drug. Still others apply for federal grants targeted specifically at matching academic and industrial partners.

Whatever the approach, those who can work at the academic-industrial interface are building an attractive skill set for today’s competitive job market. “Collaboration between universities and industry is a big deal right now,” says Rathindra DasGupta, a program director for the National Science Foundation’s (NSF’s) Division of Industrial Innovation and Partnerships.Lawmakers are “really encouraging faculty members not to solely depend on government funding for their research. And many companies are saying, ‘We cannot do fundamental research anymore; our labs are being shut down.’”

Working together seems to offer an ideal solution: industry as an alternate source of revenue for academics, and academics as a source of industrial innovation. Few argue that attempts at collaboration are flourishing. The question is how to build them for success.

Engineering a win-win

To launch his sabbatical, Tadigadapa reached out to a longtime industry colleague, Stephen Bart, director of MEMS transducer development at MKS, and pitched the idea as a means to generate a working collaboration. At first, Bart was skeptical. The idea was a bit unorthodox. But Bart knew that MKS had long wanted to explore a problem related to pressure sensor functioning for which the company lacked expertise in-house. And Tadigadapa was offering that know-how, inexpensively: MKS only had to pay for a portion of Tadigadapa’s sabbatical salary, facilities use, and travel expenses. MKS would also gain access to core facilities at Penn State and graduate students in Tadigadapa’s laboratory.

What’s more, Tadigadapa was willing to forego publication for the short term—though he did negotiate permission for his graduate students to write theses and publish on their part of the larger work. And Penn State was willing to let go of rights to intellectual property (IP). This was key because, Bart explains, “what makes the collaboration [with academics] valuable to the company is that it owns the IP.”

Although some academics might balk at either concession, Tadigadapa, who began the sabbatical this past fall, had his eye on the big picture: a longer-term partnership and “connecting my research back to the real world.” Bart adds that, despite the conditions required for such collaborations, academic scientists benefit from the opportunity to gain a “broader understanding of the technology and the marketplace, which hopefully can be leveraged into future projects.”
Negotiating the fine points

The same kind of bargaining is bubbling up in the pharmaceutical sector, where “interactions between academia and industry have changed dramatically,” says immunologist Sergio Lira, who more than a dozen years ago jumped from a 12-year career in industry to academia to become director of the Immunology Institute at Mount Sinai Hospital in New York City. A decade ago, companies sought academic rock stars who could be enticed into partnerships by “more or less open-ended research contracts,” he says. “Now, pharma is seeking academic partners who can perform specific, technical work for them.”

To bargain for the access to early discovery, sometimes pharmaceutical companies are willing to share the IP. For example, if the work is at an early, precompetitive stage, the academic institution may negotiate to own the IP, with the company gaining royalty-free rights to it. In exchange, companies can ask for more targeted collaborations: ones in which the academic researcher has knowledge of a specific molecular pathway, for example, or an assay that might be used for screening. The work is conducted in tandem or as a team to eventually deliver a product.

“We cannot go to academia and say, “You guys generate some data for us and then we will see if we can use it or not,’” says Pejman Soroosh, a senior scientist at The Janssen Pharmaceutical Companies of Johnson & Johnson campus in San Diego, California. “Instead, we generate some data here to show you that we can do some part of the cutting edge science. You do the same. Then we share ideas.”

This blurring of previously distinct lines between early discovery in academia and developing applications in industry is important for academics to understand, Tadigadapa says. It means that the recipe for success is not beginning with a milestone-laden proposal or a project with a hard-and-fast goal. Instead, the focus should be on exploration through collaboration. But collaboration does not mean just putting a group of academics at the table with industry scientists and giving them a mandate. “If you engineer an interaction, it won’t work,” Tadigadapa says. “But if you create a place where the interaction might occur, you’ll produce the ‘love.’”

Start early

That “place” is as much physical—for example, an academic working in an industrial lab on sabbatical—as it is philosophical: freely sharing potentially proprietary ideas around a conference table, for instance, or allowing some aspect of the work to be published.

The latter is particularly critical to postdocs, who can also get involved in boundary-straddling research. In October 2014, Janssen launched a postdoc program in which participants are paired with two mentors, one from Janssen and the other from partnering academic institutions located nearby their La Jolla facility, including the Scripps Research Institute and the University of Southern California (USC). (In some cases, the academic partner can be based outside of Janssen’s purview.) Postdocs spend 2 years hopping between the two laboratories, exploring mechanisms at the academic bench, for example, while at the same time learning the ins and outs of assay development and team building in the industrial labs. Both those fresh out of graduate school and those already in postgraduate positions can apply.

The program’s goal, as described by Anuk Das, head of scientific innovation at Janssen Human Microbiome Institute and co-founder of the postdoc program, sounds typical of any traditional postdoc stint: “to have a productive project focused on novel research resulting in high-impact publications.” But in the Janssen case, company and academic co-principal investigators (PIs) conceive and guide the project together. The idea is to create what Janssen postdoc mentor James Karras calls a more “balanced scientist,” who can bring the best of academia—its spirit of discovery and innovation—to the more practical realities of industry. Together with Soroosh, Karras co-mentors Gavin Lewis, one of the first three postdocs now in the program.

“As a Ph.D. or postdoc, the academic route is the only route you are trained for,” Lewis says, “but if you really want to do that bench-to-bedside research, you should learn to do both sides of it. That is what will benefit people in the end.” Lewis is not sure upon which side of the academic-industrial fence he will ultimately land, or if he can continue to bounce back and forth across it, but he says he is “leaning” toward the industrial side.

His academic mentor, USC immunologist Omid Akbari, doesn’t mind. Akbari, whose collaboration with Janssen was already in place prior to Lewis’s postdoc, sees the benefits of working closely with industry. It can accelerate his overall lab’s research, he says. By sharing ideas, data, and resources with the Janssen team, his team can more quickly move from research in test tubes to animals and even people, generating more high-impact papers ahead of academic competitors. The company also provides perks, like patent advice from the company’s well-weathered technology transfer office. But, mostly, Akbari likes the avid exchange of ideas he and company researchers enjoy as they meet regularly at conferences. With the partnership in place, “we now have this freedom to talk to each other,” Akbari says.

Get a grant

That need for free exchange has also prompted agencies such as NSF to launch programs that coax academic
and industrial scientists to collaborate. These programs are not new, but they are nonetheless very popular today.

One, called the Industry University Cooperative Research Center (I/UCRC), pulls together clusters of industrial and institutional partners interested in a particular scientific theme or “need.” Typically, industrial members articulate that need and ante up member fees (generally $25,000 to $75,000), which in part support the work by the academics, who then provide a portfolio of precompetitive research projects meant to address the need.

For example, beginning in 2007, NSF had been working with institutions, mostly academic, in Arkansas, offering translational grants to boost innovation. Arkansas-based warehouse retailer Sam’s Club chimed in that it was seeking novel ways to reduce inventory costs. Through NSF, the company partnered with academic engineers and computer scientists at the University of Arkansas and 11 other partner groups at universities around the country. They created an Excel-based simulator to replicate the functionality of the Sam’s Club inventory and logistics software, which shaved off 4%, or up to $70 million annually, of their inventory costs.

For academics, participating in these types of endeavors provides the chance to build a network of collaborators for future projects and offers a much clearer understanding of what industrial collaborators want and need. These are crucial assets given federal agencies’ current push for more translational research, says DasGupta, who led the I/UCRC Program in 2012 and now provides program oversight. He also notes that any IP emerging from the projects belongs to the universities, and companies can get royalty-free, nonexclusive rights.

The students deployed to work on projects can also greatly benefit from the experience of working with industry. “Most industrial members are really there to recruit the next-generation workforce,” DasGupta says. The program is meant to “create robust relationships and give the students tremendous visibility.” On average, 30% of students who graduate each year get jobs from industry members, he says.

On a smaller scale, NSF also sponsors a GOALI (Grant Opportunities for Academic Liaison with Industry) program, which provides money not for centers of excellence but partnerships of a few. Money goes to support faculty, postdocs, and students who want to conduct research in an industrial setting. Typically the academic submits a research proposal to a specific NSF directorate. If the proposal has an industrial partner and a cooperative research agreement, which spells out how any resulting IP will be managed, it becomes eligible for additional GOALI funding, typically $75,000, although the price tag can vary depending on the program.

Whether through a sabbatical, postdoc, or grant, “this kind of partnership is becoming more and more inevitable,” Tadigadapa says. The message to scientists is that those who can establish themselves at the interface increase their chances of thriving. “We are building the way toward the future because it is the only way.”

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The many faces of leadership

By Dave Jensen | December 2016

As you finish your graduate degree or wind down your postdoc, it’s unlikely that your first thought in the job search process will be, “Do the companies I am applying to see me as a leader?” After all, the effort you are making is all about getting a foot in the door, not landing a vice president of research role. But did you know that there is significant consideration given to your leadership ability in the decision to hire you today?

It’s never too soon to start thinking about your leadership experience and formulating how you will answer interview questions about the topic. And, because leadership styles vary so dramatically, it’s also good to start thinking early in your career about your own style and how it might develop so that you will be ready to take advantage of future career opportunities when they come your way.

Two interviews in one

After one of my recent seminars, I spoke with Steve, a Ph.D. biochemist interviewing for his first move to industry. “I am surprised that I’ve been asked a lot of questions about my relationship with others,” he said to me. “In fact, more emphasis has been placed on this than on skills that fit the requirements of the job. What’s up with this?” he continued. “I’m not applying for a position leading a team of people. ... I’m applying for jobs that have me doing independent research work at the bench.”

I reminded Steve that, when you interview, you are actually seen as a candidate for two jobs: today’s job—the job you applied for—and the position that would come after that. Hopefully you’ll prepare well for the first, because you’ve seen the job description and have been studying how closely your background might fit the company’s
need. It will also probably be pretty easy for the hiring manager to determine whether you fit the bill.

The second job you are applying for, on the other hand, is a much more difficult call for that hiring manager. She needs to think about how you fit into the growth plans that she’s developed for her organization. And it may be more difficult for you to prepare for. You’ll have to figure out how to speak about your leadership potential, even if you haven’t had real experience yet. No one will hire you only for talent at the bench; you’ll need to come in with enough people skills to at least look like you could quickly learn to lead teams or projects.

Different leadership types

In November’s Tooling Up column, I described a variety of career ladders, each with different leadership requirements and opportunities. The opportunity to manage a small research group, for example, can often come quickly, especially in startup companies. Some companies, called “dual ladder” employers, have a formal split between managers who have “direct” leadership responsibilities, and those who wish to remain as scientists. But even those who decide to stay in the ranks of bench researchers on this dual ladder must practice “indirect” leadership. Both direct and indirect leadership are important, and recruiters look for candidates who display evidence of either.

Direct leadership is practiced in the classical boss-and-subordinate relationship. You probably didn’t get this experience during your graduate education; mentoring more junior grad students does not qualify you as being a “boss.” But you may have supervised others in a job or two outside of school. Examples from your fast-food experience should be kept to a minimum, but you can offer a few during an interview as evidence of leadership experience and ability. If you were shift supervisor, for example, you learned how to supervise others on a direct basis, or perhaps when you were a postdoc, you had graduate students working for you in the lab. Experiences in delegation and management like these are worth noting.

Although direct leadership experience can be important, especially if you’re interested in pursuing a management position, that other aspect of leadership, the indirect type, is what interviewers will really be hoping to find. This is leadership via influence. Their top candidates always have plenty of this on offer, and it’s an essential ingredient in a company. Here, you may not be the boss, but your expertise in a given area gives you a large impact—and graduate students and postdocs have ample opportunities to demonstrate this type of leadership. Perhaps the principal investigator (PI) asked you to review a range of new lab equipment and, after making your recommendation, you were the one trained by the supplier to teach others how to use it properly. That’s a great example of leadership via influence.

Examples of leadership don’t need to be tied back to something technical. Perhaps your postdoc association asked you to find speakers and pull together a successful career development event. That experience puts you squarely in a leadership role and illustrates to an employer that you are the kind of person who can motivate a group to work together on a shared goal. Examples like these can separate you from other jobseekers and earn you the chance to have an in-person interview. This is great ammunition for a cover letter, or to elaborate on in your first phone interview.

Different leadership styles

Everyone has a different approach to leadership. In an interview, you may be asked to describe your boss’s approach; the type of leadership you’d respond best to; or perhaps even what kind of leadership you might choose to emulate yourself, based on the people you admire. To get you started thinking about these questions, here are a few examples of some leader archetypes, and their associated strengths and weaknesses.

The parental leader and the democratic leader

It’s easy to spot parental leaders in the ranks of professors. The parental leader will take grad students in hand as a parent would with children, protecting and sheltering them. Unfortunately, the parental leader sets up a climate where young scientists remain dependent, which can slow their career development. The democratic leader, on the other hand, sounds great at first because everyone in the lab gets a vote—but in the end, nothing gets done because consensus is often hard to find! The parental leader needs to cut the apron strings, but the democratic leader has to learn to make decisions, because progress is often brought to a halt by a lack of decisive ability.

The autocratic leader and the hands-off leader

The autocratic leader has little concern for others and refuses to see them as individuals with unique skills. Instead, to this person, people are tools to get a job done. If you’ve ever had a PI with this attitude, you know it can be a very demoralizing environment, and there is absolutely nothing worth emulating here. In contrast, some leaders feel that their people can do whatever they wish. Working for such a hands-off manager sounds great—until you find that you are way out on a limb because you have so little support. Everyone likes independence, but, as you might have found out if your adviser operates in this way, everyone also needs some occasional direction.
The driven leader and the consultative leader

The driven leader has everyone’s best interests at heart, but manages by imposing their will due to their intense passion. Forceful and objectives-oriented, driven leaders tend to forget that people want to be led, not pushed. The best approach to management that I’ve seen combines this level of passion with a consultative approach. The consultative leader assumes that each individual’s skills are unique and valuable. This leader consults with them to everyone’s advantage, and decisions reflect the combined intelligence of the team members. This approach differs from that of the democratic leader, where everyone gets an equal vote; instead, the consultative leader makes the decision after soliciting everyone’s input. And where a parental leader may give the team a sense of confidence in the leader, the consultative leader gives the team members a sense of confidence in themselves.

A company’s leaders, both direct and indirect, serve as a sort of organizational gyroscope, valued by the company for their ability to establish and maintain internal harmony. It’s never too early to develop your own leadership examples!

Additional resources

Further Resources from Science/AAAS
Science Careers Forum
scforum.sciencecareers.org

myIDP (individual development plan)
myidp.sciencecareers.org

Other Career-Related Booklets
sciencecareers.org/booklets

Career-Related Webinars
sciencecareers.org/webinars

Communicating Science
communicatingscience.aaas.org

Science & Technology Policy Fellowships
fellowships.aaas.org

Science News Writing Internships
aaas.org/page/science-news-writing-internship

AAAS Mass Media Science & Engineering Fellows Program
aaas.org/program/aaas-mass-media-science-engineering-fellows-program

ENTRY POINT! Internships for Students with Disabilities
ehweb.aaas.org/entrypoint

Books
“So What Are You Going to Do with That?”: Finding Careers Outside Academia
Susan Basalla and Maggie Debelius

The Chicago Guide to Your Career in Science: A Toolkit for Students and Postdocs
Victor A. Bloomfield and Esam E. El-Fakahany

Richard Nelson Bolles

Put Your Science to Work: The Take-Charge Career Guide for Scientists
Peter Fiske

Finding Your North: Self-Help Strategies for Science-Related Careers
Frederick L. Moore and Michael L. Penn

Notes

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Christie Canaria, Ph.D., Chemistry Executive Branch Fellow at the National Institutes of Health

Current: Program Staff, National Cancer Institute, National Institutes of Health

Applications accepted May – November 1.
To learn more and apply visit http://go.stpf-aaas.org/CareerTrends