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A better way to share plasmids

Science Career Guide

A One-Stop Resource

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www.addgene.org

Introduction to Addgene's Science Career Guide

By Joanne Kamens | October 19, 2018

Welcome to Addgene's Science Career Guide. At the inception of our Addgene blog we took time to envision how the blog could best serve the scientists in our sharing community. We knew we wanted it to be full of current science and to utilize the vast expertise of our incredibly generous community to provide the inside scoop on the best ways to use the plasmid tools deposited in the repository. To supplement these behind the scenes tips and tracks (many of which don't make it into formal publications) we also wanted to provide as much reference material as possible for researchers to get up-to-speed on the basics of molecular biology, CRISPR, and more. This focus on tools was incredibly important, but, equally important, we knew that Addgenies and their networks have a special view on science careers. We were incredibly excited to develop the blog into a place where researchers could go to find in-depth information on their many potential career paths and the skills required for them.

The fact is, there are many unique paths that scientists can take. Our community is full of people willing to share their experiences and advice on getting to and succeeding in happy science careers in academia or outside academia. Thank you to all the contributors who are taking the time to help others navigate the tough choices we all have to make. We hope this guide has a big impact on scientists at any career stage, but we especially hope that early career scientists take advantage of these lessons and resources to make good choices and robust plans to achieve fulfilling lives in science.

Joanne Kamens, PhD
Addgene, Executive Director

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TABLE OF CONTENTS

Introduction to to Addgene's Science Career Guide 2

Chapter 1: Transferable skills 7

Developing transferable skills during science training 9

Identifying your transferable skills 11

Time management 15

Teamwork 20

External collaborations 24

Managing a team 28

Career planning resources 32

How make friends and meet people at a scientific conference 35

Scientist networking: What is an informational interview? 38

Extracurricular activities for a strong science career path 40

How to lead a great meeting 43

Online social networking for scientists 46

Chapter 2: Mentoring 48

"What makes a good mentor?" and 6 more FAQs about science mentoring 49

Choosing a good mentor for scientists 51

Will you be my mentor? Finding and asking for mentoring support 53

Mentoring for scientists: I have a mentor, what now? 56

TABLE OF CONTENTS

IDP and your PI: A roadmap for career planning and personal development 58

Form your own peer mentoring group: A how-to guide for scientists 60

Chapter 3: Science career options 63

Science career options 64

What do I do now? Academic v. non-academic career options 68

Career insights: Technical support specialist 71

Careers in science communication: Science writing 75

Careers in science communication: Product development 77

Careers in science communication: Product management 79

Careers in science communication: Writing for a research institute 81

Engaging with science and society at pgEd 84

Healthcare consulting: A door to the business of life sciences 87

A career in grants: How to become a grant professional 91

Walking beside academia and giving it a high five 94

Advice for moving into sales after your science postdoc 96

Science careers: Unruly interests feed many paths 98

Advice for starting a biotech company from a grad student turned entrepreneur 100

Advice for scientists starting a lab 104

How to negotiate a successful lab start up budget 106

TABLE OF CONTENTS

Chapter 4: Getting the job 110

Is this the right place for me? 8 tactics for choosing a lab 112

9 tips for a successful postdoctoral experience 119

Experimenting with new careers while in grad school 125

Gaining leadership skills volunteering at a professional organization 129

9 tips to achieve success in academia 132

Tips for getting a faculty position 134

5 steps to writing grant proposals for grad students 138

6 tips for grant writing 141

Resume writing for non-academic science careers 145

6 steps to submitting a resume that gets seen 147

Finding your perfect job after university 149

Science communication: 9 strategies to get your foot in the door 154

Tips for writing a good cover letter 157

10 steps to a perfect science talk 162

Career coaching for scientists: Why and where do I find one? 166

Chapter 5: Management skills 169

Management for scientists: What makes a good manager? 170

Managing vs. leading 174

TABLE OF CONTENTS

Management for scientists: Delegating is key 176

Management for scientists: Giving feedback 179

Management for scientists: Seeking feedback 182

Acknowledgements and final words 184

Chapter 1

Transferable skills

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Developing transferable skills during science training

By Joanne Kamens | June 3, 2014

You are finishing your PhD or perhaps you have almost completed a postdoctoral position... or two. You have learned a lot. Whether you are pursuing an academic career path or moving in a nonacademic direction, there are many "transferable" skills you have developed in addition to learning how to be a scientist. Why not stack the deck in your favor? Look for opportunities to practice transferable skills in ways that will also enhance your science training and that will put you in position to pursue a diverse set of career paths.

Here are some concrete things you can do to develop those transferable skills while you are also learning to be an excellent scientist.

Leadership and management

Take a lead from the amazing students at Washington University who started the BALSA group, a nonprofit that provides short-term consulting services. Initiative and professional experience are prized skills.

- Supervise undergrads or less experienced grads
- Manage a project involving multiple scientists, create and stick to timelines
- Be a mentor in a formal program
- Start something (a journal, a science lunch club, a biotech club)
- Be the head of a group (like a grad student or post-doc association)

Collaboration and teamwork

One of the defining characteristics of nonacademic science careers is that a team is almost always involved. Demonstrating your ability to work well with others can be done in many ways... and many labs in academia benefit from strong collaborations to advance science faster. Help other people when you can. The colleagues you help will be future advocates and references.

- Collaborate with another lab, in another field maybe, and publish
- Join a lab that has multiple collaborations, even with industry labs
- Work on a big project that relies on a division of labor
- Serve on a committee and do something big like plan a conference
- Recruit many supporters and mentors that will speak for you (and you for them)

Communication

Being able to communicate effectively is part of what makes working in a team productive. Take all the opportunities you can to be communicating about science with others. If opportunities don't exist in your department, create

Developing transferable skills during science training (CONT'D)

them and show your leadership skills too.

- Teach classes
- Go to workshops and conferences on interviewing, resume writing, and networking
- Practice your English if you need to, go to ESL classes
- Practice your presentation skills (as much as you can), form a peer mentoring group to get real feedback
- Write whenever you can, find supportive editors so your first drafts are always excellent

Technical knowledge and creativity

Become a "thought leader," develop a technical "niche," develop a useful new assay, master a new technique, and be able to talk and own these accomplishments. Employers and academic departments want to be able to tell that you know about something and are passionate about it.

- Maintain a content-useful website, write a blog
- Pursue speaking invitations by inviting others (be on a speaker committee)
- Follow industry publications like FierceBiotech to "learn the business"
- Attend events with local networking and trade organizations

Another excellent perspective on this topic can be found on the UK Career Site for Researchers called Vitae. Vitae recently published a career development framework for career skills. Download a summary PDF here or try out the online Researcher Development Framework Planner.

Further reading

- From Academic Solos to Industrial Symphonies by Gwen Acton, Alicia Gómez-Yafal & Emily Walsh
- The Hard Truth About Soft Skills—Workplace Lessons Smart People Wish They'd Learned Sooner by Peggy Klaus

Identifying your transferable skills

By Kayla Strickland | January 11, 2018

What is a transferable skill?

Time management. I needed it when balancing a handful of demanding courses, a capstone paper I really wanted to hit out of the park, part time work, bills, (at times) a social life, and rest. I need it just as much in my current role as Customer Support and Operations Manager at Addgene. In this role, I balance my daily tasks, meet cross-team project commitments, respond to any issues raised by team members, and plan for the future of the team. All while still paying bills and having a life outside my job.

The same can be said about teamwork, communication, writing, management, and creativity; I have developed these skills through school, jobs, and volunteer work, and I guarantee you have developed them through similar experiences in graduate school. These skills will be useful anywhere I work in the future; they are transferrable across most, if not all, industries and work environments. This is why they are called transferable skills.

Why are transferable skills so important?

It is important to identify which transferable skills you possess because any potential employers, collaborators, or co-workers want to know that you are a well-rounded individual with more going for you than your technical expertise in a specific field.

While searching for jobs and making connections, avoid falling into an identity trap where you assume your technical skills define you and that the other not-so-technical skills you've built over time are only applicable to those positions you have already held.

Identifying your transferable skills (CONT'D)

Imagine this situation:

You've spent hours scouring a company's LinkedIn pages, given yourself the bathroom mirror pep talk, forgotten and then retrieved your lucky socks, persevered through a nerve wracking commute complete with a disabled train, and now you're sitting in the lobby of (hopefully) your future employer. Your heart is pounding, you're short of breath, and you're a little jumpy.

You are at another interview, and this job was made for you. They must have been looking at your resume while they wrote the job description. You check off all the boxes - you have the desired degree, you have mastered the applications they use, you've gained experience working with similar protocols, and look - they're seeking someone who has, to a T, all the research skills under your belt from your last job. You knock the technical portion of the interview out of the park. It's clear that you know how to do the job.

You may think this means you're guaranteed to get the job, however, many times the hiring team will also want to examine not just technical skills, but also transferable skills, before offering someone their dream job; They want to know if the candidate has what it takes to thrive at the company and add value, not just "do the job."

When they ask about your creativity, your potential manager wants to hear a specific time that you thought outside the box to solve a problem. When they ask about your communication style, your potential teammates want to be assured that you will contribute openness, clarity, approachability, and professionalism to team meetings and projects.

It is crucial to identify these strengths within yourself, and to demonstrate them to the people who make hiring decisions. Though having all the technical skills certainly matters in the job market, it is the transferable skills that create a full package and add an extra shine to your work. Knowing your transferrable skills allows you to build on them even more, get more out of every piece of work you touch, and be a more attractive candidate for that ideal job.

How do you identify your transferable skills?

PLoS One recently published an article identifying gaps in scientists' transferrable skills. In describing the limitations of the study, the authors noted that "many trainees may not recognize the degree of teamwork ability they have developed as part of a successful collaboration and fail to identify it as a personal strength until it is identified by another person. Similar reasoning may also apply to other acquired skills."

It is nice when other people point out how awesome we are, but there is also value in knowing and owning your transferrable skills yourself so that you can grow them even more, get maximum satisfaction out your work, and be prepared for new and exciting opportunities.

Here are some strategies for identifying your transferable skills:

Put yourself in situations where you can learn more about possible strengths and weaknesses, and view everything as a learning experience. If your first reaction to an opportunity is to say "no, that's not in my wheelhouse," take a second to reflect.

Identifying your transferable skills (CONT'D)

For example, say your boss approaches your team with a project she needs one of you to lead. At first you might think, "I'm not a leader," because you don't see yourself standing in front of a crowd and using your charisma to give people hope for some shiny vision on the horizon. You're about to keep silent and move on to other things....

Stop! Take a step back and think of a time you've led your team in a defined direction in the past. Maybe there was a time you noticed an issue with a protocol and you took it upon yourself to fix the issue and train everyone on your team about that new process. You stepped up and got your team on the same page. This came naturally to you. How is this new opportunity much different? Might you already have leadership skills that are just not being tapped at the moment? You can take this time to step up and develop your nascent leadership skills. You might just find that you're more of a leader than you thought!

When change happens at your organization, when your boss needs someone to step up, when a new venture presents itself even outside of work, consider challenging yourself, take the opportunity, and discover if this builds upon a skill you maybe didn't even know you possessed.

Think about your shining moments. Recall a few times you really felt great about your work. Maybe you received praise from a coworker or boss. Determine what skills you used to produce such great work.

Say your manager approaches you with glowing feedback from a client you helped. Maybe you awkwardly say thanks and move on with your day, feeling good but focused on all the other things you have to do.

Pause! Enjoy that feedback, bask in the glow of a job well done, take some time to think, and write your thoughts down! What skills did you use in this specific situation? Maybe you demonstrated empathy for a collaborator or co-worker and showed that you really understood their side of an issue. Maybe you also showed critical thinking skills by dissecting their problem and piecing together a really great solution that covered all the bases. You may have also used your writing skills to convey your empathy and your awesome solution to the person over email.

Examine your current and past job descriptions. Scan through all the things for which you are officially responsible on paper, and take some time to write down all the skills that you have learned and that you frequently have to exercise in order to manage these responsibilities.

If you are in charge of completing many meticulous protocols or tasks, you've probably developed an attention to detail. If you are managing more workflows than you can count on your hands and toes, you've likely collected some great time management, and organizational skills. If you are responsible for working with lots of students, managing inventories in the lab, or organizing a research project, one can assume that you've had to flex your conflict management and communication skills quite a bit.

Grab a piece of paper and list all the skills that your current or past job requires day-to-day, and you'll get a great snapshot of the skills that you can bring into pretty much any other workplace. To get your mind working, take a look at the short list of transferrable skills here and consider which of these skills you've used in your own work - I'm sure you've used many!

- Teamwork

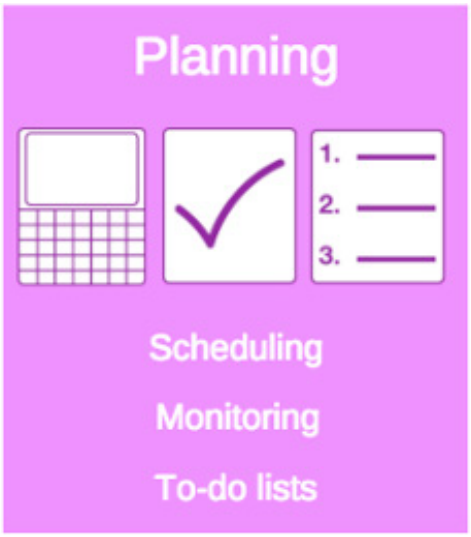
Identifying your transferable skills (CONT'D)

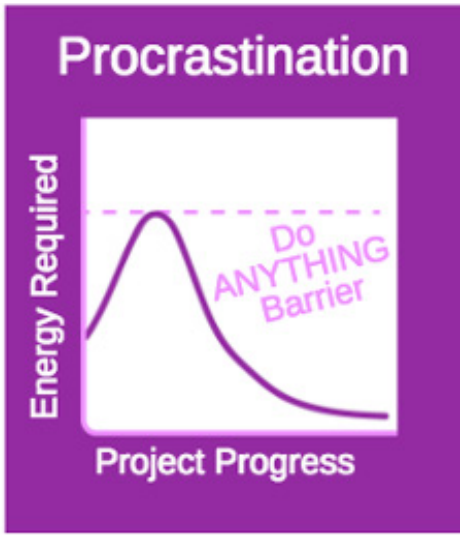
- Collaborating with others outside of your organization
- Public speaking
- Time management
- Managing a team
- Conflict resolution
- Organization
- Leadership
- Problem Solving
- Creativity
- Data analysis
- Listening
- Negotiation

For further advice on highlighting your transferable skills in that big job interview, check out this article from The Muse.

Time management

By Tyler Ford | Dec 5, 2017





A recent survey of PhDs found that many researchers feel that they lack formal training in a variety of transferable skills. At Addgene, we've set out to fill this gap by both highlighting that researchers do learn MANY transferable skills while working in the lab and by offering advice on areas where you might need some help.
Back when I used to do mammalian cell culture, I would often respond to friends asking me to dinner saying something like, "I'll be there in a few minutes, I just need to split some cells." Inevitably, this task would take longer than I thought, I'd be too late to meet up, and I'd just end up spending more time in the lab.

Obviously I didn't have the best time management skills, but I've learned a lot since my days as an undergrad working with cancer cell lines. As I started planning out my own experiments in graduate school, I had to divide my time between lab work and practicing my SciComm skills and I had to coordinate with other people for a variety of projects. I was therefore forced to learn a variety of ways to manage my time. As a busy researcher, you've probably already started coming up with time management techniques of your own, but if you ever find yourself in need of a few ideas, I hope you'll find this post useful.

After a bit of research and thinking about my own processes, I've broken down time management into three conceptual chunks: prioritization, planning, and procrastination.

Time management through prioritization

Every time you begin a task, you're actively prioritizing. In my anecdote above, I prioritized splitting cells over meeting up with friends, but didn't realize it until it was too late. I didn't spend enough time thinking about the possibilities and how to prioritize them.

When deciding what tasks you're going to take on over the course of the day, month, or even the year, you should be thinking about two main things:

1. How useful the task is (its utility)
2. How much time it will take you to complete the task

Time management (CONT'D)

When picking which tasks to actually do, you should err on the side of things that have the most utility; i.e. those things that will be most useful for achieving your goals. However, you should have a good mixture of useful tasks that can be accomplished quickly and things that will take longer. Completing the quick and useful tasks will swiftly give you the wonderful feeling of accomplishment while the longer tasks will give you larger payoffs later.

Don't be afraid to accomplish some quick but moderately useful tasks at the expense of time spent on the long and highly useful tasks. The quick accomplishments will likely energize you.

For example, let's say you're doing a multi-day experiment in the lab. You have two ways to set up the experiment. The first way, it will take you 3 days to complete the entire experiment, but you'll have to spend the entirety of each day doing the experiment. The second way, it will take you 5 days to complete the experiment, but you'll only spend half of each day on it. The other half of each day you can spend accomplishing small tasks (like... preparing plasmids to send to Addgene). Following my advice from above, you should probably take the second option. Even if the full experiment fails, you'll still have made small accomplishments each day that should help keep you content and give you the energy to finish any additional work you might need to do.

In most cases, I would recommend the second option for the experiment above, but it's also important not to load yourself up with too many tasks. If you're constantly switching between different projects, you might not be able to make any reasonable progress on any one of them. That's why, as I'll discuss in the planning section below, it's important to dedicate specific amounts of time to specific tasks beforehand and assess whether that time was sufficient for the task later. If not, then you should definitely allot more time for that task the next time around.

Finally, when prioritizing, you should always be aware of deadlines and think about what they mean in terms of the utility of your tasks. In my cell splitting anecdote, I probably could have grabbed some food with friends and come back to the lab to split my cells later. Eating with friends has a somewhat immediate deadline - even the best of friends get hangry at some point. My cells, on the other hand, could have waited. Both tasks have some utility, but I lost all the utility (fun) of eating with friends by splitting my cells first.

Time management through planning

I probably wouldn't have fallen into my cell splitting issue at all if I'd planned appropriately. Back in my undergrad days, I had general goals for my experiments, but didn't spend enough time thinking about when or how long it would take to achieve these goals. I have far too many projects to operate this way now.

Talking about "planning" is easy, but actually doing it in a productive way can be quite difficult. In my experience, planning has 3 components:

1. A mechanism for blocking off time for different tasks. I use Google calendar for this and try to give myself flexibility by never placing too many activities too close to one another.

2. Monitoring task progress. For this, I always make sure I have explicit goals in mind for the endpoints of a task or project (with metrics if possible) and, at the outset of a task, I outline the activities that are needed to

Time management (CONT'D)

accomplish these goals. Practically speaking, this means I write everything in a Word or Google doc that I can comment and make notes on as I progress. I've also recently started using Trello to manage larger, multi-person projects.

3. Day-to-day, flexible to-do lists. Because I know what my goals are (see monitoring task progress), and I know that I've blocked out time during my day according to my priorities, I have a pretty good idea about the specific things I'll be doing through the course of any given week. Knowing this, I hand write to-do lists at the start of each day to remind myself of the specific activities that I need to work on. Throughout the day, I cross items off as they are accomplished or I add to the list as the need arises.

Why do I write things down? It's more viscerally appealing for me to physically cross things out (it just feels good) and I remember things better when I write them down. Some people also find it useful to write out their to-do lists at the end of the day so they can jump straight into tasks the next day. If you work in a job where you're pulled in a thousand directions at the start of the day, writing your to-do list the night before will help keep you focused.

For a real-world example, let's say I've blocked out time during my day to write a blog post, edit other blog posts, and contact PIs for an upcoming visit to a university. My to-do list might look something like the image on the next page (and for those of you who can't read my terrible handwriting, is copied below):

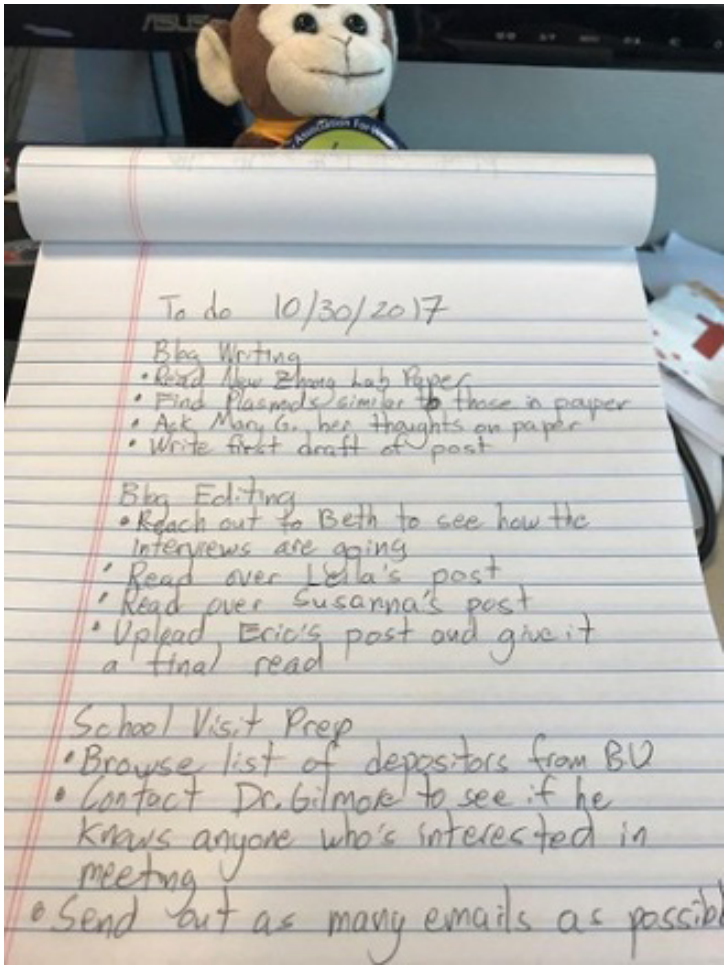
- Read new Zhang Lab paper
- Find plasmids similar to those in the paper
- Ask Mary G. about her thoughts on the paper
- Write first draft of post

- Reach out to Beth to see how the interviews are going
- Read over Leila's post
- Read over Susanna's post
- Upload Eric's post and give it a final read

- Browse list of previous depositors from Boston University

Time management (CONT'D)

- Contact Dr. Gilmore directly to see if he knows anyone who's interested in meeting
- Send out as many emails as possible



While accomplishing any one of these things won't mark an end to the broader project they're a part of, completing them will give me some sense of accomplishment. I will prioritize which of these items I work on according to how much time I have blocked off for each project and how useful each item is. For instance, if I don't have a draft blog post ready for publication for tomorrow, I'd better upload that post from Eric before doing anything else.

Preventing procrastination

Even if you've done all the prioritizing and planning in the world, procrastination can easily prevent you from making progress on a task. For instance, even if I had planned my day extensively, my lack of desire to go sit in the tissue culture hood may have prevented me from splitting cells until late in the day anway. There are a few things I've found useful to avoid such procrastination:

1. Remove distractions: Probably the easiest way to do this is to leave your phone in your bag on "Do Not Disturb" during the times you've blocked out for other activities. This is also part of why I do much of my writing and editing by hand - the internet and all it's enticements are far too distracting. (As a side note, I'd recommend the book, Bored and Brilliant for learning more fantastic reasons to remove yourself from distractions every once in awhile.)

2. Reframe the task in a way that highlights the things you like about it. For instance, while I may have found splitting cells boring, hanging out in the tissue culture room also gave me time to listen to some of my favorite podcasts.

3. JUST GET STARTED - One Harvard Business Review article on procrastination recommends testing out how much time you can possibly handle doing a particularly annoying task and then dedicating that much time to it each day. Once you get over the activation energy barrier that comes with making ANY progress, the task will likely be much easier. Having a formal plan for your day will make this easier - if you know you have dinner plans at 6 p.m., you had better get started early enough to finish everything you need to do by 6 p.m.

Hopefully you'll find this post useful for making your days, experiments, and projects more manageable. If you

Time management (CONT'D)

have any other time management suggestions, note them in the comments section of the blog post associated with this section.

Teamwork

By Eric J. Perkins | Nov 28, 2017

A recent survey of PhDs found that many researchers feel that they lack formal training in a variety of transferable skills. At Addgene we've set out to fill this gap by both highlighting that researchers do learn MANY transferable skills while working in the lab and by offering advice on areas where you might need some help. In this section: Teamwork.

My first experience on a successful scientific team came as an undergrad at Worcester Polytechnic Institute. Though some WPI students chose to go the solo route for their Major Qualifying Project (or MQP, the school's equivalent of a senior thesis), I knew early on that I wanted to work with a partner. WPI's emphasis on teamwork was what drew me to the school in the first place. The famous discoveries and experiments I'd been learning about for years were usually the products of teams: Watson, Crick, & Franklin, Meselson-Stahl, Hershey-Chase...Who was I to dispute history? And boy did I make the right decision. If I'd spent my senior year isolating pheromones from various C. elegans mutants by myself, I would have slowly gone crazy. As it was, my partner Mike and I split the work, shared the credit, and we both won accolades that would launch our careers in science.

Fast forward nearly 20 years and I am known by some colleagues as the "cross-team guy" at Addgene, an unofficial title that I happily embrace (and admittedly, I may have started that nickname myself). I have my own little Product Management Team, but I'm also an emeritus member of the Scientist Team, a member-by-association of the Development Team, and I contribute to the Management Team that steers the organization. As an Addgene vet familiar with the expertise and skills of many of my colleagues, I can also orchestrate the formation of high-functioning-but-temporary teams that have a specific purpose and finite goals. For example, when it came time to update how we make and distribute kits, I helped assemble a crack team of Addgenies that includes:

- Michelle, the Senior Scientist who coordinates all kit creation and quality control efforts with depositors;
- Gizela, the lab member who knows how the physical kits are made and shipped;
- Chiara, the tech transfer expert who understands the somewhat complicated Material Transfer Agreement process that kits require;
- Nicole, the webmaster in charge of all our externally facing kit pages.

No single person could possibly understand every nuance of how kits work at Addgene, but with the help of these people and others, we have updated our kit process substantially and have plenty of ideas for further improvements.

Types of teams

There are, of course, many types of teams. Some teams may be relatively permanent; some teams may only need to exist for a year, or a few months, or even a few weeks. The important thing to remember is that every team should have a goal, or at the very least, a clear reason for existing. Here are a few types of teams that exist at Addgene - team types that could exist anywhere in science (see next page):

Teamwork (CONT'D)

A. The assembly line represents a functional team - team members expertly do their parts to fulfill an ongoing service. B. Building a home requires a project team - a mix of people with specific skills who work together on a finite goal. C. The Civil Rights Movement was lead by a longstanding team that worked together to fulfill a mission.

- Functional or Process Team. A Process Team is a group of people with distinct skills who fulfill a long-term function. When a select group of people are responsible for a group of specific processes, they must work in sync to get tasks done. At Addgene, the Scientist Team is responsible for guiding new deposits into the repository, performing quality control, and providing technical customer service. Team members are highly trained, and though there are necessary redundancies in skills, individuals also tend to have their own specialties. This type of team can exist indefinitely. If you're looking for this type of team in academia, look no further than your core facilities. If your university is lucky enough to have an imaging core or tissue culture core, you are looking at a process-oriented team serving a particular function.

- Project Team. A Project Team is assembled to complete a series of tasks with precisely defined goals and endpoints. "Project" is a very broad term since a project goal could be just about anything. Is the goal of your project to launch a product? Make an informed decision about something? Fix a problem? Test a hypothesis? Whether you officially call it a "project team" or not, most scientific collaborations fall within this category. Unlike a process team, you don't necessarily want a lot of redundant skills - you just want the necessary skills. You might find that your next paper is going to require help from a biochemist, a geneticist, a microscopist, a biostatistician, and that one golden-handed technician who can do a certain difficult assay with her eyes closed. How many times have you ever seen a scientific article attributed to a single author? I've seen so few in my 20+ year career that I can't help but feel a bit dubious when I do come across one. Also, remember, one important feature that all projects have in common - and by association, project teams - is that they come to an end. A project that never ends is a poorly planned project indeed.

- Mission Team. A Mission Team is assembled to make progress towards open-ended goals whose metrics for success are defined by ongoing mission fulfillment. Earlier this year, I joined Addgene's Green Team, a like-minded group of co-workers who want to make our organization as environmentally friendly as possible. We worked with Andrew, the team's founder, to create a mission statement in the first few meetings and we've volunteered our ideas, skills, and time to the cause ever since. Unlike the previous two team types, the skills are not cherry-picked. We take what we can get since participation on such a team is strictly voluntary. New members could be recruited, but certainly not conscripted. There's also no end-game here, unless we manage to make Addgene the most environmentally friendly organization on the planet, in which case whoa! Mission accomplished! One example of a mission-based team in

Teamwork (CONT'D)

academia would be your school's post-doc association. And if you're a post-doc at a school without such an association, start one! These teams can offer a sense of solidarity you're going to crave.

The benefits of a team

So why is it helpful, or sometimes even necessary, to build a team in the first place? Let's think about some of the advantages of team-based work:

- Nobody knows everything anymore. John F. Kennedy once famously said, "I think this is the most extraordinary collection of talent, of human knowledge, that has ever been gathered at the White House - with the possible exception of when Thomas Jefferson dined alone." There was a time in human history when an intelligent, motivated person really could know a little bit about everything or in Jefferson's case, even a lot about everything. Fast forward a few hundred years and there are currently about 5.5 million articles in the English version of Wikipedia alone. Humans have been forced to specialize in order to deal with all the new information in the world, so a process or project or mission that requires a broad knowledge base is going to necessarily need a diverse group of people to provide that base.

- Sometimes there's just too much work. If you are one of those graduate students putting in 60-80 hours a week in the lab, guess what? You are doing the work of more than one person. A selfish part of you might not want another person's name on your next paper, but you are not doing yourself or your science any favors by trying to go it alone. The help of fellow lab members and collaborators will not only get your paper out the door much faster, but getting helpful feedback from other people who have a stake in the outcome will ultimately improve the quality of the work as well.

- Social interaction is a good thing. Part of you needs to interact with other people, whether you want to acknowledge that or not. I just Googled the phrase ,"people need social interaction" and received 104 million results (Here's the top one at the time of writing, in case you're interested). "But I'm an introvert!" is not an excuse. Every psych test I've ever taken has declared me an introvert, and I identify as one. But some time around 10th grade, I snapped out of the phase of my life that had me listening to Simon & Garfunkel's "I Am A Rock" on repeat in my bedroom. I realized I could and should be interacting more with other people, and becoming part of a team is a really good way of creating and strengthening those social bonds. So never mind how much better your work and productivity will be if you're part of a team - it will just make you a happier person.

What does a good team need?

Besides that all-important sense of purpose, there are many more things necessary to make a successful team. Entire books have been written about this! But this is a blog post, so here are just a few critical features based on my own experience:

- Leadership. Few things are more frustrating than being on a leaderless team. Sometimes the leader just has to be the person to say, "OK, guys, we need to have a meeting about this." Sometimes the common roles of a leader can be successfully doled out to multiple people: someone to coordinate, someone to decide, someone to delegate, etc. If you find that there is not someone (or someones) taking on these

Teamwork (CONT'D)

responsibilities on a team to which you belong, consider stepping up. Otherwise, you risk putting effort into a team that is doomed to be ineffective.

- Defined Roles. Though every team should have a leader, other team roles will vary depending on the type of team. Knowing what roles your team requires to function is certainly necessary, but equally important is making sure all team members understand what roles they're meant to fill and what their responsibilities are. That's a subtle but important distinction. If I invite someone to be on a project team, I try to make it very clear why that person is there. If it becomes clear after a few meetings that a person is neither adding to the discussion nor getting anything out the discussion themselves, then one has to question whether that person should be on the team. As a team leader, I've (diplomatically) booted people off teams. I've also kicked myself off of teams when I've realized that I really can't contribute anything. Purging team members does not have to be an act of criticism or judgment - nobody likes to feel useless, and excess people who are not contributing will detrimentally affect a team's morale and efficiency. You could also just as easily discover you need to add some people if you find there's a need for an expertise your current team members don't have - sometimes you just don't know who you need until the team really starts functioning (or malfunctioning).

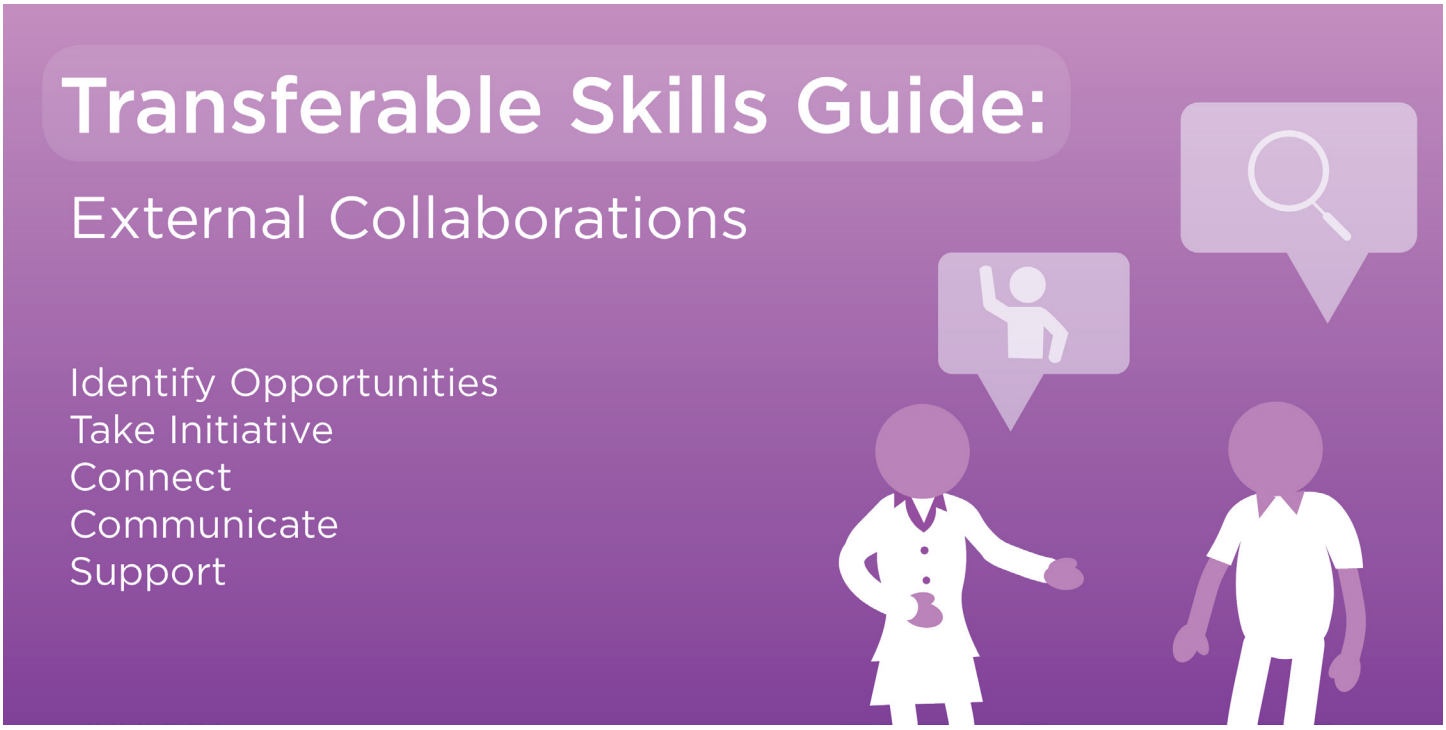
- Clear Lines of Communication. Few people actually like meetings, but run well, meetings can be a critical part of any successful team. For reasons I don't understand to this day, my post-doc adviser almost never had lab meetings. In my nearly 4 years in the lab, we probably didn't have more than a few dozen lab meetings. The lab, as a team, suffered for it. Nobody knew what anyone else was doing, and there were times when some members really should have been getting feedback from each other. Though meetings are helpful, they are certainly not the only communication options. Addgene, along with an increasing number of academic labs, uses Slack constantly. Whether your teammates are two desks away or on the other side of the world, communication platforms like Slack make teamwork easier.

- Trust. Ultimately, your team could have a strong sense of purpose, an excellent leader, and perfectly clear lines of communication, but if teammates don't trust each other, none of that matters. If you are on a team, any kind of team, and you have nagging doubts that someone else on that team is putting their own self-interest ahead of the team's goals, then that team is destined to do poorly. To some extent, it doesn't even matter whether that other person really is acting against the team's interests or not; once that seed of distrust is planted, it can spread like kudzu. Think of a soccer player who gets a reputation for taking risky shots at the goal rather than going for assists that are more likely to lead to scores. That player doesn't trust his teammates; the teammates don't trust him. This team is not going to win games.

The myth of the lone scientist slaving away in a lab to make the Next Great Discovery is exactly that: a myth. The original Dr. Frankenstein from Mary Shelley's novel worked alone, but even the movie makers saw how absurd this was and gave him an Igor. Science shouldn't - and really can't - be done alone. So, if you consider yourself part of the scientific community, get used to the idea of working on teams. Even if you end up on some teams that don't necessarily work well, you can learn from the experience and make sure your next team works better. In fact, don't wait to be invited onto a team. Make one yourself. Instead of thinking "What's my angle on attacking this problem?" try thinking "Who can I assemble to attack this problem from every angle?" Your science will be better for it.

External collaborations

By Susanna Bachle | April 19, 2018



A recent survey of PhDs found that many researchers feel that they lack formal training in a variety of transferable skills. At Addgene, we've set out to fill this gap by both highlighting that researchers do learn MANY transferable skills while working in the lab and by offering advice on areas where you might need some help. In this section: collaborating with others outside your organization also known as external collaborations.

Interestingly, the ability to work with others outside one's organization was found in the aforementioned survey as one of the the skills favored by research-intensive careers. External collaborations are becoming increasingly important as more complex approaches to scientific questions become popular. There are only so many methods and machines one team can learn so linking together expert teams can push a scientific project to the next level.

External collaborations and partnerships are also very important in a non-research context, especially when considering small to mid-sized companies and organizations. Addgene as a nonprofit organization is very considerate and thoughtful about its limited resources. Rather than developing entire new teams in house to solve every problem (although we do that too), we will often look for partnerships where we can leverage another organization's expertise to our mutual benefit. Our partnership with SnapGene, for example, allows us to display high-quality maps and annotations without us having to invest too much of our internal software development resources into it. At the same time, this project gives Snapgene great exposure to the community of biological scientists who use Addgene everyday.

To get this and other projects like it going, someone (likely several people at Addgene) had to take the initiative to find a suitable partner, connect the relevant teams, coordinate implementation, and now must focus on managing the established partnership. If you're willing to do similar things for your team or lab, you're likely to

External collaborations (CONT'D)

be seen as a huge asset! As is true for any skill, there is a learning curve for collaborating and it is always a good idea to start close to your comfort zone and slowly expand from there.

Start small: Collaboration opportunities within an organization but outside your comfort zone

As part of my position at Addgene I am now involved in Strategic Partnership Management, a very interesting and exciting part of my work. However, this is not the first time I've had a role in organizing collaborations. During my graduate studies at Karolinska Institutet I started working with other groups. First within my department where we shared materials and equipment between labs. Later I worked with people outside the department to accomplish a variety of goals. For example, I worked with some microscopy enthusiasts to start a microscopy seminar to connect the imaging community and to create a platform for discussions and potential collaborations. We invited experts from other universities and maintained a mailing list. This project gave me practice reaching out to other scientists, being clear about what was expected, and keeping track of speakers.

During your graduate or postdoctoral work there are loads of opportunities to create communities, platforms, and to be a part of projects that connect people and make you work in a collaborative environment. Think of student groups, postdoc associations, and specific projects where you share methods, and equipment between lab groups and departments.

You don't have to get these types of projects and groups going alone - if you are aware of a problem or a need for something, usually someone else has realized this too. Begin with informal conversations about your ideas and don't be afraid to make something concrete happen. You may have more willing collaborators than you realize. Being at a university provides the perfect platform for practicing initiative and for training in teamwork and collaboration management. For example, you may already be part of a scientific collaboration - show

Surmounting the Difficulties of Collaboration

Communication: Even if you speak the same language, communication can be difficult across organizations. Make sure to set rules and guidelines in the beginning of a collaboration. For example, give timelines when responding to emails and be clear about who is responsible for setting up meetings and taking notes.

Setting Expectations: It is generally a good idea to be clear about expectations and goals when starting a project with several teams. Different organizations can have very different working styles, attitudes, and priorities for the project.

Awkwardness: Let's face it, when you first dive into a networking event or introduce yourself to people outside of your comfort zone, you're going to be a bit awkward. No worries, so is everyone else. Push yourself to start up a conversation and ask people about themselves. For 1 on 1 or more formal settings, it pays to know what topics you'd like to discuss so don't be afraid to write yourself some notes beforehand and mentally check off the things you'd like to cover - just don't make it all about you!

Learn to read people: Whenever you go into a collaboration (or any conversation really) you should make an effort to understand how your collaborators perceive your ideas and actions. You may have great reasons for doing something that aren't as obvious as you think they are. If you notice your collaborators are avoiding a topic or that they seem stressed, take steps to get a better understanding of the situation from their perspective. You may need to explain that topic in a different way or reach out to your collaborators directly to avoid future problems.

External collaborations (CONT'D)

initiative and start organizing meetings and take minutes. Get to know your collaborators from other institutions personally on conference calls and make sure to maintain these relationships by keeping in touch by email and social media (see the section on "Maintaining Relationships" below).

Expand: Collaboration opportunities outside an organization

The next step is to expand your efforts beyond your organization and/or scientific field. Reaching out to people who have little in common with you is much harder than starting a collaboration with a colleague. However, reaching outside your knowledge sphere allows you to connect with experts that complement your (scientific) skill set and is therefore very useful for complex projects. It is also fun! I really enjoy learning from others and meeting people with different mindsets and approaches can truly broaden your mind.

When I first began collaborating with people outside my lab's department, I personally felt that I had to overcome some hesitation to 'approach strangers' and learn how to communicate outside my scientific expertise. Organizing a career fair for early-career scientists provided a crash course in this discipline. Getting companies to come to these types of events can be very tough. First I needed to find the right contacts at the companies and then convince the contacts to give me some time to talk or to at least read my emails. Then pitching myself and the event was very difficult and somewhat awkward in the beginning. But, as so often happens, one gets better with repetition. I learned to look at the event from the company's perspective, focus on the message and keep it short. Soon, discussing with strangers stopped feeling weird and started to be fun. I just had to remember to approach the relationship with the perspective of my potential collaborators in mind.

Being at a university allows you to approach people outside the university within the context of learning and, in my experience, mistakes and insecurities are more easily excused. When you reach out as a student, people tend to respond in a supportive way and are willing to help because you are not (yet) asking for a job or a big favor - you are generally asking for some advice and guidance. The relationships you establish in this way can, of course, lead to jobs and even favors, but you should not go into a professional relationship expecting these things. In this context, I often found people outside my university approachable, friendly, and helpful.

Finally, don't forget about collaborations and projects you can do with others after work. Get sponsors for a training weekend for a sports club, find speakers for a meetup or recruit volunteers for your local animal shelter. There are many opportunities so just pick the one that you feel enthusiastic about and get started. You never know where the relationships you develop will lead!

Stay in touch: Maintaining relationships

Great progress! You are collaborating with your neighboring lab, you've met interesting people at conferences and you have successfully reached out to people outside your organization. Now comes the hard part: maintaining these relationships.

Personally, I find this to be the most challenging and time-intensive part of relationship building. However, it is essential when aiming for long-term projects, collaborations, and partnerships. There are many different ways to maintain a relationship - many of them involve personal meetings and common interest so naturally this may be easier to accomplish with people at your organization. You can meet collaborators for lunch, make a point of talking to them at a seminars, or even set up regular meetings.

External collaborations (CONT'D)

Meeting people outside your organization just to have a quick chat can be rather tricky (think people based in different countries). Here social media is a connector and virtual meeting place: You can follow interesting people on Twitter and maintain a connection by commenting and sharing. LinkedIn or ResearchGate allow you to send personal updates as messages and keep you up-to-date on your collaborators' professional developments without directly contacting them.

One great way to transition from an internal to an external connection is to make sure you keep open lines of communication with colleagues who move on to new organizations. Keeping in touch with your old lab mate may just land you a job someday. Universities themselves can help you do this through practical tools like alumni networks.

I find it useful to remind myself to check in regularly with collaborators for example on a holiday or for professional updates. Whenever I see interesting events, articles and newsletters I make sure to share them with a short note - this creates a thoughtful way of interacting and is much more effective than simply sending a message asking how things are going.

Science careers where the ability to start and maintain external collaborations is important?

In my current job at Addgene I work with people from various organizations in science and beyond. For example, I help organize scientific workshops, manage conference attendance, and I scout for potential business partners. I am glad that I was able to build experience during my graduate studies in regard to reaching out to new people, checking in regularly, and maintaining useful notes that remind me about the current state of a partnership. Every collaboration and partnership is different as are the individuals that are part of them. I'm delighted that these collaborations give me opportunities for continuous learning and growth through my interactions with many different types of people.

As mentioned in the beginning, the ability to work with others outside your organization is important for success in research-intensive careers. In addition, this skill is a hallmark for jobs focusing on: Science Policy, Business Development, Administration and Intellectual Property (Sinche et al., 2017). So if you enjoy taking initiative, connecting with others, and organizing collaborations, keep these jobs in mind!

Further reading

1. Sinche, Melanie, et al. "An evidence-based evaluation of transferrable skills and job satisfaction for science PhDs." PloS one 12.9 (2017): e0185023. PubMed PMID: 28931079. PubMed Central PMCID: PMC5607200.

2. "Collaborate: An Imperative for Graduate Students" from Inside Higher Ed

Managing a team

By Karen Guerin | January 30, 2018

A recent survey of PhDs found that many researchers feel that they lack formal training in a variety of transferable skills. At Addgene we've set out to fill this gap by both highlighting that researchers do learn MANY transferable skills while working in the lab and by offering advice on areas where you might need some help. In this section: managing a team.

You've just been promoted, congratulations! You're now a manager with your own team! But what does it really mean to manage a team?

If your graduate school experience was anything like mine you didn't think much about management skills during your scientific training. I never thought about management skills before being propelled into the position of manager. I barely had any experience being managed! The good news is that management skills can be taught, but it will take time so be patient and keep an open mind.

First let's clear up a misconception about being a manager: yes, being a manager means being someone's boss. But it does not mean shouting orders and trying to get everything done your way. According to Merriam-Webster "to manage" is:

1. To handle or direct with a degree of skill,
2. To work upon or try to alter for a purpose and
3. To direct the professional career of.

Like everyone else I mostly learned through experience and from my mistakes. Here I'll share what I wish I knew when I first became a manager.

Managing a team (CONT'D)

Know your people

Each person is unique and should be managed accordingly. I wish I knew that when I was "managing" a couple of undergrads back in grad school. Both were hard-working scientists-in-training who got the job done, but I struggled with what I thought was a lack of motivation in one of them. He left after a semester while the other student stayed until he graduated. Years later I attended a formal training for new managers and I had a "Eureka" moment while reviewing the results of my Myers-Briggs test: my undergrads were different people! More specifically, they had different learning styles. One was a "Doer" and the other was a "Scientist." My "Doer" did not lack motivation, but he didn't want to spend hours reviewing papers to piece together the best protocol; he wanted to get going and learn through doing things. Had I realized that at the time I could likely have retained this talented undergrad.

The point here is managing is not "one size fits all." Manage the individuals in your team: learn what motivates them (keep in mind that it can be very different from what motivates you!), know their unique skills and strengths (you will likely have reports with different levels of experience), find out what their learning styles are and capitalize on them for the benefit of the team. By properly managing the individuals in your team you will have a much better chance of creating a high-performing team - which is every manager's dream.

Learn to delegate effectively

As a manager your role is not to do all the work yourself anymore. Personally I found this to be particularly challenging. As PhD students and postdocs we are used to doing (almost) everything ourselves and it's a hard habit to break. But as a manager you will be quickly overwhelmed if you don't delegate - as I quickly learned!

I was a poor delegator at first. I knew what needed to be done and how to prioritize but I just added the "most important" tasks my schedule. This was bad for 2 reasons. First, it soon became obvious that I didn't have time to do everything as I planned and I was missing deadlines - which puzzled me because I could do all these tasks before I was a manager! Second, my direct report was not engaged because I only left him/her with small tasks and s/he was always asking for more work (this is a big hint that you are not delegating enough!).

There is no way around the fact that new team members need to be trained, which may seem like a waste of your time at first. After all, you know exactly what and how to do it so shouldn't it be faster to do it yourself? Training certainly takes time - so plan accordingly - but think of it as an investment: once the person is trained you will have more time to focus on what you should be doing : writing a grant, thinking about the next project, reaching out to other teams, expanding your network....

I found it helpful to plan my week(s) in advance as much as possible so I could more easily identify what to delegate and to whom (make sure that person has time for it!). Then schedule a meeting to discuss the work, set expectations, answer any questions, and (most importantly) decide on a timeline. My experience is that tasks often don't get done if there is not a clear deadline. Finally check-in regularly, make yourself available, and encourage questions. Unless you're delegating a recurring task to a seasoned report, there should be questions!

Remember that delegating is not just a way to create more time for yourself, but it will help develop your team

Managing a team (CONT'D)

members by giving them new opportunities. I still need to check myself sometimes to make sure I am delegating well, but it does get easier over time!

Communicate often and early

As a manager you need to clearly state expectations and goals. Yours and your team's success depend on it. Equally as important is to be able to actively listen - this can be hard - but it is the best way to avoid mistakes due to miscommunication and to detect trouble. I'm not comfortable with awkward silences but I've learned to embrace them after one ended with the person in front of me saying "I've been doing some of X's work for a couple of weeks now." I had no idea this was happening even though I met with X on a weekly basis! The silence and maybe even the slight awkwardness can spur people to speak up. Once aware of the problem, I was able to resolve this issue - with coaching - before it became a major problem. But I also learned to ask specific questions. "How's everything going?" is likely to get you "good" or "fine" as an answer which is not really helpful. "What is the best/worst part of working with X?" is going to get you what you really want to know. Remember that one on one discussion can be confidential.

Finally, provide timely feedback. We often associate feedback with end-of-the-year performance review, but feedback should be given throughout the year and in a timely manner. If someone's performance or behavior is inadequate, you need to address it as soon as possible for the best outcome. Nobody likes having these conversations, but waiting and hoping it will fix itself is counter-productive. I always assume that reports want to succeed at work and providing feedback is needed for that. In many cases reports are not aware of issues until you bring them up. I wouldn't go as far as saying that your reports will be grateful for the feedback, but at least you can start making changes for the best. Positive feedback is equally as important so don't forget to recognize someone's hard work and reward a job well done. Your report will (needs to) feel valued.

Talk to your manager and find a mentor

Your manager should support you, just like you are supporting your report(s). This means that you should be able to go to your manager for advice if you're not sure how to face a particular situation. But keep in mind that a good manager should help you work through your situation, not tell you what to do. Unfortunately this is not always the case or you may not feel comfortable reaching out to your manager. This is when having a mentor - someone more experienced to guide you - is valuable.

Protect your team

Make you team feel safe. Your team members need to trust you and you need to encourage them to speak their minds. They will make mistakes and you will take responsibility (within reason!). Try to buffer them from unnecessary pressure "coming from above," which is when other skills such as negotiation and being assertive become handy.

In summary, I've had "good" and "bad" managers and I've learned from both. The former will empower you, keep you motivated and help you grow in your role. The latter will make you feel discouraged and not valued which will undoubtedly negatively impact your work and your life.

It's up to you to decide which one you want to be!

Managing a team (CONT'D)

Further reading

1. Becoming the boss. Harvard Business Review, January 2007.

2. Three Rules for Managing a Successful Team. Naturejobs blog by Joanne Kamens

3. Are Good Managers Born or Made? UPenn Wharton Business School Blog

4. The management chapter of this eBook.

Career planning resources

By Michael G. Lemieux | November 14, 2017

A recent survey of PhDs found that many researchers feel that they lack formal training in a variety of transferable skills. At Addgene we've set out to fill this gap by both highlighting that researchers do learn MANY transferable skills while working in the lab and by offering advice on areas where you might need some help. In this section: Career Planning Resources.

The key to ensuring success during graduate school and beyond is to live in your lab, right? Wrong! While it is clearly a good idea to be diligent in your research, remember that you will not be a graduate student or postdoc forever, and you need to be thinking about what comes next. To that end, one of the most important things that you can do now is diversify. Read on for an overview of some of the resources you can use to better prepare for your career, and increase your chances of landing that next coveted job!

Professional development (or lack thereof)

One of the biggest challenges facing students today is that many graduate and post-doctoral programs lack any formal or mandatory professional development training. Further, even for those students and researchers who do take the initiative to develop themselves, resources are often scarce and difficult to identify. So what specifically should you do? What follows are just a few suggestions based on what I have found to be especially beneficial during my own graduate career – and in fact, some of the very things that were so critical to me landing my own position!

Conferences

One of the single most important things you can do to plan for your career is to expose yourself to other working professionals, and one way to do this is to attend conferences. Depending upon your discipline, there are different types of conferences that you might attend. Societies, such as the American Society for Cell Biology (ASCB) or the American Chemical Society (ACS) are just 2 examples of organizations that hold large, annual conferences. Gordon conferences offer more focused and discipline-specific experiences, and several Gordon conferences are held every year in different locations all over the world.

But simply attending the conference is usually not enough. How do you stand out from the hundreds of others that did the same thing? Make an effort to meet people. Attend smaller talks within the bigger conference, especially ones that are more career-focused. After these talks, introduce yourself to the speaker and offer your business card (yes, you should have a business card; it's a bit more informal, and a lot easier to hand out than a

Career planning resources (CONT'D)

CV or resume). If you receive a card in return, make sure to follow up with a professional "thank you" via email. You've now made a connection, and connections are how you get jobs!

Job fairs

Speaking of jobs, it seems like an obviously important experience, but far too many students and young professionals will never attend a job fair! Similar to a conference, job fairs bring you face-to-face with working professionals, with the added benefit that most people at the fair will probably be willing to accept your CV or business card. Be warned, though – someone accepting your CV doesn't necessarily mean that you are a future employee of the company. It does, however, offer you an opportunity to make a personal connection; the importance of which will be elaborated on later. As for what job fairs to consider, some of the best options are the Naturejobs Career Expo and the ACS career fair, which are larger meetings offering resources for students seeking employment within industry or academia; although the ACS career fair is more industry-focused. For another industry-geared option, try the Biospace career events page. Biospace holds career events all over the country; sometimes several per month, giving you a plethora of opportunities to explore!

Again, attending one of these fairs is a great start, but you need to do more than just show up. Do your homework and know who is going to be there, so that you can tailor your CV accordingly. Make it stand out with key words and by putting your most relevant experience at the top. You may also consider visiting any of the employer's career pages to look for current job postings. You may then reference the connection you made at the job fair when you formally apply for the position. This post on Business Insider nicely summarizes good job fair practice.

Career pages, LinkedIn, and other online career resources

Once you've identified places you'd like to work, get online and take a look at the company or institution's career page, where you're likely to find current job openings. A good approach is to do this first for companies at which you've already made a personal connection. That way, once you've identified an appropriate job opening, you can send your contact an email with the relevant info and they just might personally hand your credentials to HR, greatly increasing your chances of getting a phone interview!

If you don't have a particular employer in mind, you may consider starting with indeed.com or monster.com, where you'll find a variety of listings. Post your CV and make it visible, which will sometimes result in a recruiter giving you a call. Many companies enlist the assistance of recruiters for identifying appropriate job candidates. If you do receive such a call, make sure to get that person's contact information and again, make a personal connection! Even if you don't get the specific position he or she originally called about, you can keep in touch and reach back out when you are looking to change positions in the future.

Anyone looking for work in today's job market should have a well-groomed LinkedIn page. Here you can search for jobs, post your CV, and, most importantly, manage your professional network. This is probably the easiest way of seeing who you know, where they are, and who they know all in one place! This information can be critical to a focused and effective job search. As with any online forum, there is an etiquette that you should follow, nicely summarized in this post on Forbes.com, and here on LinkedIn.com.

Career planning resources (CONT'D)

Mentors

You may have an adviser, but do you have a mentor? There is a difference. A mentor is someone who has gone where you hope to go, and who will invest in your success. If you are a graduate student or post-doc in a traditional training program, and you hope to make a career in academia, you are likely in good shape, as your own adviser will probably have a lot of relevant experience and information to offer. However, if you hope to have a career outside of academia, you may need to look a bit harder to find your mentor. This may be a connection you've made at a conference or job fair, or it may be someone at your institution's career center. Alternatively, it might even be a colleague. A mentor does not necessarily need to be someone a lot older than you are; try using ResearchGate to see where other graduate students and post-docs from your institution have gone, and try sending them a professional email asking for information, but not a job! This is good etiquette when contacting someone professionally that you do not know very well; always ask for information and establish a connection with that person before ever asking them for work. Addgene's very own Joanne Kamens, a strong advocate for career planning, has written a great blog on choosing good mentors for scientists.

Continuing professional development

Professional development should be life long, and doesn't end after you get your first new job. To set yourself up for success in the career you hope to have, you must think outside of the box (most likely your lab, in this case). It is important to realize that you have to take responsibility for your own professional development, not count on your institution, program, or adviser to do it for you. Expose yourself to working professionals by attending a conference (many graduate schools will even pay for you to attend!), exploring a job fair, and utilizing your local career development center, if one exists. Get online! Review company and institution career pages. Make yourself visible on LinkedIn and other popular job site webpages. Importantly, find a good mentor that can share relevant experience and resources with you to ease the way. Make connections, and nurture those relationships. Then when you are ready to apply for your dream job, you'll be in the best possible position to secure it!

Further reading

1. Business Insider, "11 Tips to Get Something Useful Out Of A Job Fair"

2. Forbes, "15 Suprising Rules You Should Know Regarding LinkedIn Etiquette"

3. LinkedIn Etiquette: 20 Do's and Don'ts

4. GradSchools.com "Grad School Roadmap"

5. Find Job Opportunities for Scientists on docjobs.com

How to make friends and meet people at a scientific conference

By Joanne Kamens | August 7, 2014

There is essentially no better place for a scientist to make new relationships than at scientific conferences. Conferences provide the opportunity to meet people who are interested in the same things you are on a deep level. Right away you have something in common. Namely, the scientific question you are interested in and this is a great ice breaker. Of course, real relationships go further and grow over time, but being interested in the same phosphate of your favorite kinase is a good start.

Perhaps you think that meeting other scientists is not a priority for your career. Actually, it is crucial for all scientists, academic and non-academic, to always be meeting as many other scientists as possible.

- You never know when you will meet a potential collaborator
- Some of these people you meet will review your papers or grants in the future, and don't be surprised to know that people think more favorably of scientists they know personally
- Scientists in your field will know about grants and projects that might help your work
- Tenure can depend on your national recognition and the more people you know, the larger your profile in the community
- Job hunting outside of academia is all driven by personal connections

What can you do to get the most from the time and money you are spending on a conference? One thing to consider is the size of the conference. Large conferences have many opportunities but can be overwhelming as far as meeting new people. At large conferences, look for smaller events or meet-ups to connect with others more easily. Attend special interest group sessions that match your interests. I favor small conferences where the attendees stay onsite and eat together because scientists have time to really connect with others whose company they enjoy on a professional and personal level.

Here are some tips to get out of the rut of hanging out with only your lab mates (let's face it, you see enough of them).

Before the conference

- Make sure you have a business card – even students and postdocs. There are many inexpensive/free places to order cards. There are a few good reasons to have a card but two of the best are: if you give someone a card they are more likely to remember you if you follow up and if you give someone your card, they have to give you theirs!

- Think about how you want to introduce yourself and what you do. You can probably use some scientific terms when socializing at a conference, but start with a more general intro until you know if the person you are talking to is really in your direct area.

How to make friends and meet people at a scientific conference (CONT'D)

- Review the conference schedule and attendance list. Plan the sessions you will attend. Research the speakers in advance and make a note of those you would like to try and meet. Don't worry about contacting someone much more senior than you – meeting scientists at your level of training is always a good idea.

- Make contact with other attendees in advance. Join a LinkedIn group (or make one!) or find the conference's Twitter hashtag. Use social media to let others know you will attend. Meet some people online to follow up with in person. Email lab members that have moved on to see if they will attend.

- Make a date or two for beer, coffee or meals with colleagues you know will attend the conference. Invite others to join you. A fun, memorable meal is a great way to build relationships.

- Make a list of experimental problems or questions you are pondering and be ready to talk about them. People love to help especially when solving problems.

During the conference

- The conference may start in the airport. If you see someone traveling with a poster roll, say hello.

- Keep your cards handy and make sure your name tag is always visible. Some people learn names by seeing them. It is OK to ask someone to see their name tag if you are one of those people.

- Meet people in sessions by sitting next to someone and introducing yourself. Put your phone away! This is a natural time to meet someone since you are both interested in the same talk. Read more on this advice to "never leave an empty seat" here.

- If there are communal meals, sit with people you don't know and put your phone away (did I say that already). Start with, "Is this seat taken? Can I join you?" Next talk about the food and then move on to science. More great tips on conference meal etiquette are here.

- Don't only talk about science and work – casual socializing is how people build relationships that are memorable. It isn't always appropriate to walk up to someone much more senior than you, but you can safely seek out scientists your own age. Some will be friendly so stick with those.

- Don't miss social opportunities, but don't overdo it (some of my best studies were designed over late night poker games at Gordon Conferences). You don't want to be so exhausted that you can't get a lot from the presentations and programs.

After the conference

- Follow up with the new people you met at the conference. If you promised to send a paper, send it. If you had a nice time, send a note to say so. If you read a paper that you think would interest them, send it and ask for their imput.

How to make friends and meet people at a scientific conference (CONT'D)

- Connect with people you met on LinkedIn, especially if they are not in academia. Make sure to learn how to use LinkedIn properly. Then, follow LinkedIn to see when your connections post. Stay in touch by liking, commenting and re-sharing their posts. LinkedIn users notice this sort of connection. You can also see and offer congratulations on job changes and promotions.

- Follow academic scientists on ResearchGate and/or via Pubmed alerts. Congratulate your connections when they get a new paper published.

- Stay in touch enough to plan to meet up at the next conference. Once is just a meeting, but having lunch twice turns a stranger into a friendly colleague.

Further reading

1. Scientist Networking: What is an Informational Interview?

2. Crash Course On Socializing At A Scientific Conference Dinner - by Julio Peironcely on the Thesis Whisperer

3. "Not Networking - Building Relationships for Success" webinar with Joanne Kamens via ASCB

Scientist networking: What is an informational interview?

By Joanne Kamens | July 1, 2014

Training as a scientist in the academic system has many pluses. I delighted in my graduate school years for allowing me to focus wholly on the science I love. This immersive nature of academia often means that scientists-in-training rarely get the opportunity to learn about the myriad of diverse, nonacademic careers that will be available once they have a graduate degree in science. I find it ironic that we do all of our training as scientists (5-12 years worth!) with academic scientists who can't help us learn about the nonacademic sphere where most of us will be working.

It should be no secret that one of the best things you can do during your training is meet interesting people doing interesting things. I call this building relationships because networking has gotten a bad reputation (as in..."I just hate networking"). Scientists enjoy learning new things. Building new relationships is all about learning new things from other scientists doing interesting work. Consider this to be like any other research project. You've met someone whose career interests you or you want to pursue someone doing a job you wish you knew more about – how do you make a connection? An Informational Interview is a great next step in your research.

What an informational interview is NOT

If you ask for an Informational Interview it is understood to be a nonthreatening request to discuss experience, interests, and career path. Because there is no demand for a favor, the person you ask will be more likely to say yes and more open to developing a relationship. The time to develop relationships is before you need them (well really, always). Informational Interviews are for learning and for expanding your web of connections.

A mistake made by many novice networkers has a potential to alienate connections. If meeting with someone to ask about a job or a particular position at their company, do NOT call this an Informational Interview. If you do this, the connection may feel like you have misled them. It is fine to ask about specific jobs (that is what networking is about), but be upfront about interest in a job. Ask openly to be connected to someone who can help you land that position such as a direct connection to the hiring manager. They might say yes and they might say no but do not confuse networking for a job connection with ongoing relationship building through Informational Interviews.

Making your information interview productive

Informational Interviews are best conducted in person. Perhaps you can offer to buy coffee or lunch at a place convenient to your interviewee? It is always best to meet in person to develop relationships, but if it is not possible consider a phone or video call. If you do decide to use Skype, make sure to follow the rules of successful, remote conversations.

Scientist networking: What is an informational interview? (CONT'D)

In this interview you will be asking the questions, so be prepared. There are many good lists of questions on the internet. To make the most of the opportunity, use a written list and take notes if that is helpful. Keep in mind that this is a good time to ask personal questions about salary, opportunities for advancement, challenges and disappointments. These more personal questions can elicit the most valuable insights you will get from the interaction.

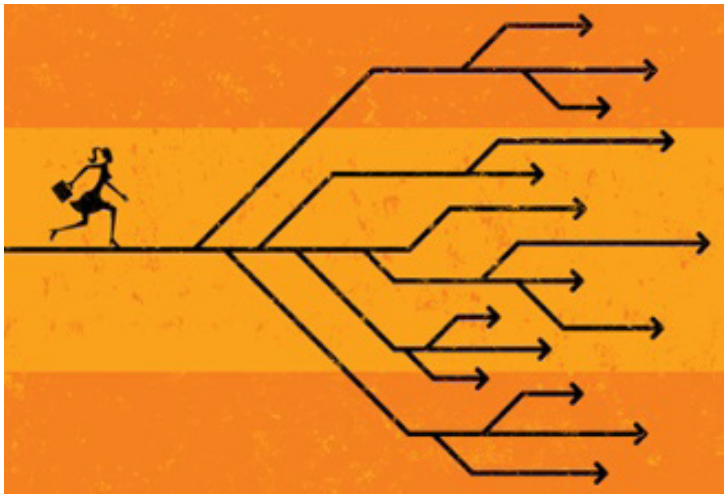
Most people like to help

One good place to look for interesting connections is your university's alumni database. Sharing a school is a little connection that many people honor. Talking with strangers is usually challenging but does get easier with practice. Another perk of Informational Interviews is that it is a great way to practice for real interviews where you might spend a whole day having to talk with strangers.

Be bold in asking all kinds of people to connect with you and to share their stories. Thanks to the Benjamin Franklin Effect, most people actually enjoy helping (just ignore the people too busy to respond to you). You will uncover interesting opportunities by meeting with people working in diverse and unusual fields. My favorite final trick is to end each Informational Interview with the question, "Can you connect me to anyone else you think I should talk to?" That way you are always setting up your next opportunity to learn.

Extracurricular activities for a strong science career path

By Margo Monroe | Jan 21, 2014



Which graduate student hasn't been asked the question: "Academia or industry?" Once academia was the clear answer with a well-defined path to professorship. But recently a downward trend in funding and space in academic research labs has more students looking for other options. While graduate programs provide support for academic career development, it's often left to students to identify and build the necessary skills for alternative careers. Science Careers has developed a web-based, career-planning platform called the Individual Development Plan (IDP) and uses it to match qualified scientists to jobs in industry, academia, and government. This great resource allows the undecided to learn about a variety of science professions based on their skills and interests. Once scientists identify potential career pathways, education and mastering new skill sets must occur by doing work outside of the lab.

Extracurricular activities don't have to be 'extra'

Today's graduate and postdoc training focuses on using multidisciplinary, collaborative, and translational approaches for scientific tool and technique development. However, careers outside of the lab highlight "transferable" skills such as leadership, management, and communication. A great approach to fully understand and acquire competitive skill sets in a myriad of professions is to engage in extracurricular activities (EA). EAs can:

Introduce new perspectives in science and engineering

Looking at your research from a broader viewpoint may expose which experiments are crucial in demonstrating the true innovation, impact and, in turn, the big picture of the project. For example, how can future regulations impact your work? What design variables need consideration?

Enrich your knowledge and skills outside of the lab

Effective verbal and written communication skills are key to publication and acquisition of funding. If a grant committee is not convinced that your project is an innovative solution with a strong impact, or a journalist does not understand the high-level science discussed in an interview, your project may not advance beyond its initial stages.

Help you build a network outside of the academic world

Participating in activities outside of the lab expands your professional network. No brainer! Engaging audiences from across the hall, fields, and other professions increases your chances of finding a well-suited job.

Extracurricular activities for a strong science career path (CONT'D)

EAs shouldn't be viewed as an unproductive time spent away from the bench, but as an opportunity to expand associations outside of the traditional academic setting and to shape and strengthen interests and skills. Although the word "extracurricular" may be taboo in the lab, multiple research studies highlight the importance of taking a break and incorporating EAs into your routine.

Getting started: Planning your career path and identifying needed skills

First, evaluate your skills, values, and interests. Are you particularly good at writing and editing manuscripts? Are you interested in scientific policy? Next, use the resources below to identify potential careers that suit these skills and interests:

- Use career planning tools such as the Individual Development Plan to generate a list of potential professions
- Google potential careers to gather more information
- Follow people in academia, industry, and government on social media (Twitter, Facebook, etc.) to learn about available jobs, fields, and trends
- "Never Leave an Empty Seat" at conferences and seminars, as this is a valuable time to network
- Attend informational interviews to gain insight into the daily routine of the potential job
- Join LinkedIn and other job sites to find open positions and view their required qualifications and skill sets

Taking the time to identify and research 2-3 potential professions will highlight which skills you should focus on improving and will help reveal potential opportunities beyond academia. Once a profession sounds interesting, TAKE ACTION!

Taking action: Examples of extracurricular activities

The table on the next page lists potential EAs and which professional skill sets are strengthened. This short list highlights the ubiquity of skills across professions within and beyond academia.

As the number of qualified scientists entering the workforce increases, EAs allow graduate students and postdocs an opportunity to tailor their career paths for competitive positions both within and outside academia. Use EAs to network and learn new skills, while also getting a much-needed break from your lab bench.

Want further information about shaping your career to your values, interests, and skills? Curious to know where graduate students and postdocs are currently getting hired? Let us know what topic you'd like to learn more about next. Leave your suggestions in the comments section.

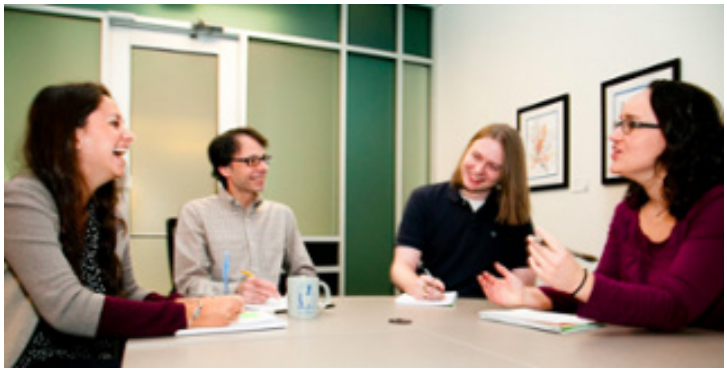
Extracurricular activities for a strong science career path (CONT'D)

Table 1: Examples of extracurricular activities

Activity	Professional skills developed
Open source classes (e.g. edX, MIT OpenCourseWare)	• Access to knowledge outside your particular field of study • Assess your interest in a different field
Outreach activities (e.g. Volunteer at a local high school science class: Science Club for Girls)	• Communication to diverse audiences • Organization • Mentorship • Leadership
Science writing competitions (e.g. Access to Understanding, Wellcome Trust Science Writing Prize)	• Writing • Communication • Publicity
Consulting internships	• Communication • Teamwork • Management • Leadership • Networking
University technology transfer office positions	• Market analyses • Patent process • Business Models • Communication • Regulatory knowledge • Networking
Blogging	• Writing • Communication • Networking • Publicity
Business competitions	• Leadership • Management • Marketing • Communication • Business models
Conference or club organizer	• Management • Leadership • Communication • Networking

How to lead a great meeting

By Carissa Fish | February 9, 2016



Meetings often get a bad rap as annoying interruptions to our "real" work. However, a well-run meeting can have quite the opposite effect. A great meeting should produce collaboration - a sense of dialogue and community among participants, clarification - new and useful information, and invigoration - a renewed energy for continuing the project after leaving the meeting. Follow the tips below to learn how you can run a top-notch meeting.

Define the meeting

Define the purpose of the meeting: Begin meetings by stating "The purpose of this meeting is to _____." Everyone in the room has likely just run in from some other commitment. An announcement of purpose can help everyone to 'land' in the meeting and get focused on the task at hand.

Define the scope of the meeting: Are you meeting to design an entire experiment and delegate tasks to lab mates or to discuss a potential new research direction you'd like to pursue? Undefined scope can lead to long meetings spent on details that do not yet need to be decided. Figure out what you need to accomplish to get to the next stage, and then adjourn.

Define the tone of the meeting: Show enthusiasm for your meeting's subject matter! If you seem bored or discouraged, everyone else will too. Even if you are meeting to discuss something difficult, be excited about the prospect of working toward a solution. At the end of the meeting, make sure to thank everyone for their participation and offer encouragement for the next steps (see "action items" below).

Get the right people in the room

There are few experiences more frustrating than sitting through a meeting with no idea why you are there. Make the most of everyone's time by considering the level of meeting you need.

Project Meetings: You do not have to include every person who could potentially be impacted by a project. Instead, invite the experts on the topic at hand. Invite one "ambassador" from each affected team to be the representative in the meeting and then communicate outcomes to the rest of their team. Here's a template for project meetings.

Team Meetings: For standing team meetings, provide agenda sections for each person to add a bullet or two about what they are working on. Building this into the agenda ensures that everyone gets a chance to talk and less vocal team members still have their voices heard. Here's a template for team meetings.

How to lead a great meeting (CONT'D)

One-on-Ones: Managers should set up regular check-ins with their employees. 15-30 minutes weekly or monthly will usually suffice to keep both parties on the same page. Managers will get a sense of the employee's workload, updates on current projects, and offer feedback. The employee should ask for input on projects and let the manager know if any additional resources are needed.

All-Company Meetings: As your organization grows, so will the length of your group meetings. Make sure to keep them manageable. At Addgene, teams can add as many points as they like to the written agenda, but each only gets to address one point aloud. This keeps our all-company meetings short, informative, and pleasant.

Email: Sometimes, the right meeting is no meeting at all. When no discussion is needed and you just need to give everyone a heads up (for example, notifying people of an updated protocol), send an email instead.

The 3 A's - Agenda, Action Items, and Accountabilty

Agendas: Send around talking points for the meeting a day in advance. This gives everyone a chance to review the agenda and add anything that is missing. During the meeting, take notes on the agenda points. At Addgene, we like to do this live on the screen using a Google Doc.

Action items: Before leaving the meeting, skim back through your notes and pick out the action items. Move them into a separate section at the top of the agenda, and assign each one using group members' initials. If appropriate, email this around after the meeting.

Accountability: At your next meeting, start by checking in on the action items from last meeting. Use some positive peer pressure to make sure everyone completes their assigned items to keep the project moving.

Action Items from Last Meeting	• Share Dropbox link to PDF for e-signature how-to (EM) • Questions for interview (EM) • Picoroom setup (CF) • Coordinate w/Dev team re: Auth. Signatory info on approval page (KS) • Mods to auto-emails re: account verifications (EP) • Review this doc and this doc and provide input for holiday shipping (all)

Use time wisely

Meetings are for talking, not reading: Send around relevant documents, like proposals to review or project plans, before the meeting. At Addgene, we like to send around a Google doc where people can make comments. At meetings, we just focus on the parts where people had questions or suggestions, instead of reading the whole thing together.

How long do you actually need? Just like liquids, meetings tend to fill the shape of their container. Consider whether you actually need a full hour to achieve the purpose of the meeting (see "defining the scope" above) or if you can cut it down to thirty minutes.

How to lead a great meeting (CONT'D)

Keep it moving: If you tend to get stuck diving into details, ask a colleague to help keep you accountable for moving along. Remember, many of the more in-depth discussions can happen "off-line" with just one or two relevant people.

How often do you need to meet? Use trial and error to determine the best frequency for your meetings - daily, weekly, monthly, or quarterly? My team used to meet monthly, but we found our meetings took almost two hours and we felt out of touch. By moving to weekly meetings, we cut the time down to an hour or less and are able to provide more timely feedback on each other's projects. For all-company meetings, monthly still works best. Figure out what works for you for each of your meeting types (see above).

We've provided some tips above for what works well at Addgene, but meetings are never one-size-fits all. Feel free to play around with different strategies and find out what works for your organization. Ask for feedback from your colleagues. When you attend a well-run meeting, note what worked well and ask the meeting leader for some tips. Before long, you will be running collaborative, informative, energizing meetings all your own.

Online social networking for scientists

By Kendall Morgan | May 19,2015

As Joanne Kamens has pointed out, there's surely no better place for scientists to meet and mingle with other scientists than at a conference. But in this increasingly wired world, more and more of our day-to-day personal interactions are taking place online. And if findings from network science apply to scientists, then building and maintaining an open social network is key when it comes to career success. In this enterprise, more scientists are finding online tools to be instrumental. At Addgene, we're all about helping develop a scientific community, so here are some tips to help you get more involved with your scientific network online.

As Holly Bik and Miriam Goldstein wrote in their PLoS Biology paper, "In the age of the internet, social media tools offer a powerful way for scientists to boost their professional profile and act as a public voice for science." In "An Introduction to Social Media For Scientists," Bik and Goldstein offer many tips on how to take advantage of mainstream social media. The article focuses on some of the popular social media tools available and the potential benefits that can be reaped from using these tools.

Most of you probably know at least a little something about Facebook and Twitter (for more on Twitter see our post "Why Scientists Should Give Twitter a Try"). And those can be useful ways to stay connected with friends, family, and colleagues and, particularly in the case of Twitter, to follow the science news of the day. For professional purposes, LinkedIn is probably the best of the mainstream tools.

But, sometimes those noisy mainstream channels are little more than distractions. No worry, after a slow start, social networking tools aimed specifically at scientists and researchers have begun to take off. According to a Nature survey on online collaboration, more and more scientists are finding these sites useful for maintaining their profile and "professional presence."

5 popular online networking tools for scientists & academics

- ResearchGate's "mission is to connect researchers and make it easy for them to share and access scientific output, knowledge, and expertise." Based on the Nature survey, they seem to be leading the pack of research-oriented social networks.

- Academia.edu calls itself "a platform for academics to share research papers." Academia.edu may be less popular than ResearchGate, but the company says it has more than 21 million people signed up.

- Mendeley combines an online reference manager with tools for online sharing and collaboration.

Online social networking for scientists (CONT'D)

- ResearchID assigns researchers with a unique ID to make it easier to update personal profiles with new publications and to identify potential collaborators.

- Twitter is a great place to engage with other scientists. A number of scientific fields, such as synthetic biology and genome engineering, have robust communities on Twitter - scientists tweeting and retweeting the newest publications, news, practical advice, and more. Just follow scientists in your field or relevant journals to stay up-to-date with minimal effort. Check out some facts about scientists on Twitter.

6 tips for using online scientific networks to your advantage

- Choose the right tool. Explore the various social networking options. Consider your personal interests and goals and choose the one or maybe two networking sites that are the best match for you.

- Make yourself known. Set up an online profile at your social networking site/s of choice that introduces your background, research interests, publications and expertise in a way that's approachable for colleagues, journalists and the general public.

- Start building your network. Find people to connect with, whether you know them personally or not. Identify people with common interests and follow them or invite them to connect with you virtually. If you find yourself deluged with irrelevant information, don't hesitate to stop following someone or explore ways to organize or filter your connections.

- Make a plan and set limits. Social networking requires engagement, but it's easy to find yourself wasting time. Set regular times to check your online networks and to connect with others online.

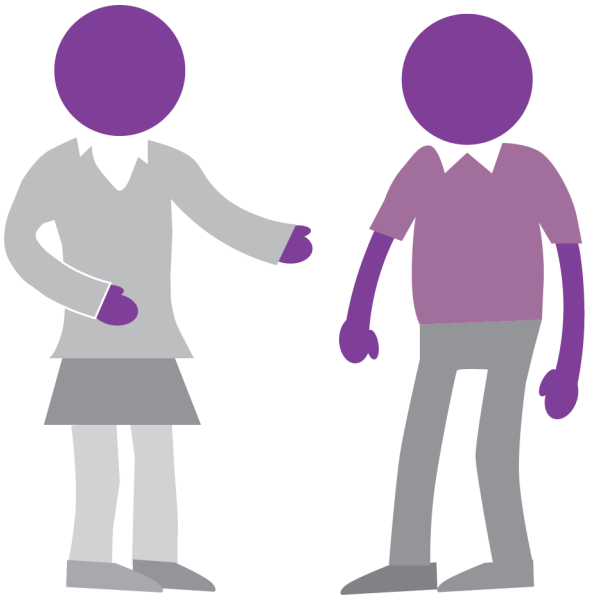
- Consider your tone. The nature of online conversations may vary a lot from one network to another or among groups within a network. If you aren't sure about the tenor of the conversation at first, it's OK to lurk for while.

- Bring your virtual network to life. Online social networks can be good places to identify people who you'd like to meet in person. Look for opportunities to do that at an upcoming conference, workshop, or speaking engagement.

- We encourage you to explore. And, if you've got something to say about how these tools have been useful to you (or not), please feel free to share in the comments.

Chapter 2

Mentoring



"What Makes a Good Mentor?" and 6 More FAQs About Science Mentoring

By Joanne Kamens | December 17, 2013

Mentor, Sponsor, Advisor, Boss – who will help me advance my science career? We spend many years becoming scientists. It takes us a decade or more for just the "training" portion of our careers. In that time we may have only 2-3 formal supervisors that will provide guidance and experience. Navigating a fulfilling career in science can be challenging – is advice and guidance from only 2 people enough?

For many years I've been organizing mentoring programs for scientists and doing training to help mentors and mentees have fulfilling, productive relationships. I will be sharing what I've learned along the way in this ongoing series of blog posts.

Top 6 questions scientists ask me about mentoring

In this blog series, I plan to provide answers to the top questions scientists ask me about mentoring. Here they are:

1. What makes a good Mentor?
2. How do I choose an Advisor/PI who will also be a good mentor?
3. Where can I find a Mentor?
4. How do I ask someone to be my Mentor?
5. I have a Mentor – what do I do now?
6. What is this I hear about "group" or "peer" mentoring?

What makes a good science mentor?

I started a conversation about many of these topics with the researchers who joined a recent Twitter chat for Early Career Researchers. Many of the participants had certainly realized the importance of seeking out mentoring as an important aspect to their ongoing success. There were unfortunate stories from researchers with advisors who did not serve as good mentors, but many had examples of very productive mentoring relationships with advisors and others who helped shape their experience. This led to the topic of "What makes a good Mentor?"

Some of the Tweeted comments:

- "A good mentor has your goals/needs/situation in mind, rather than (or as well as) their own."
- "Someone to act as your 'cheerleader' – inspire you."
- "Also a mentor can give you realistic expectations. (Don't think you can finish that book in 4 weeks!)"
- "Sometimes a mentor is a sounding board--a good mentor asks more questions than answers them."

A good mentor does all of these things and more. It is instructive (and entertaining) to review this list of bad mentor behaviors. Sadly, it is Yoda who is singled out as a bad mentor. Apparently, a good Jedi does not

"What Makes a Good Mentor?" and 6 More FAQs About Science Mentoring (CONT'D)

necessarily an excellent mentor make. Are your current mentors/advisors like Yoda? If so, you might want to find additional sources of wisdom. While somewhat lighthearted, the article does highlight key characteristics of a good mentor:

- Helps set concrete goals and helps you reach your goals
- Listens well and communicates clearly and openly
- Gives honest feedback without ever being demeaning
- Does not micromanage (teaches you to fish, doesn't fish for you)
- Helps identify a Mentee's strengths and make the most of them
- Is not threatened by the Mentee's talents or ambitions
- Encourages the Mentee to take risks

A great Mentor is often one that devotes time and energy to thinking about how to be a great Mentor.

A recent post on the blog "Tenure, She Wrote" is titled, "What Kind of Mentor Do I Want To Be?" In this excellent essay Acclimatrix, an assistant professor at a research university in the northeast, writes a thoughtful treatise on the kind of advisor/mentor she wants to be for her new lab. If only every science trainee had such a dedicated person guiding the start of their career.

"I want to be a PI that holds my students accountable for their actions and pushes them to improve even as I'm flexible enough to accommodate economic difficulties, family trouble, or health and mental problems that get in the way. I'd like to be validating without being coddling, to listen without being taken advantage of, and to respect my students as developing colleagues even as I reinforce the necessary power dynamic between advisor and students."

Choosing a good mentor for scientists

By Joanne Kamens | January 16, 2014

A scientist-in-training will spend 10 or more years with a small number of formal advisors learning how to be a scientist. It is shocking how little pre-work most PhD students and postdocs do to ensure the advisors they choose will be ones that help them succeed after the training period. While there are many aspects to choosing the right labs (see the section on choosing a lab for more info), in this section we'll focus on how to choose an advisor/principal investigator (PI) that will also serve as a good mentor. To read more about what makes a good mentor, see the later sections in this chapter.

Different types of mentors for grad school vs. postdoc

Choosing an advisor to complete a successful PhD is different from choosing a lab for postdoctoral work. However, selecting a lab with a PI who is a good mentor is important in both cases. As a PhD student you need to learn how to be a scientist. Your PI should be the kind of mentor that will teach you how to: interpret data, solve research problems, develop general technical proficiency, communicate your work, maintain ethical standards and interact professionally with other scientists. The specific research area is not as important as choosing a supportive, positive role model.

By contrast, as a postdoc, you should choose a field that you may want to work on in your future career, so the research topic will be more important. In addition, it is crucial that you choose an advisor that will support your growth in your science career. Will you be given opportunities to learn and practice successful grant writing, lab budgeting, equipment acquisition, public speaking and personnel management? If you are thinking about a non-academic path, will the PI support this path and help you pursue any career alternative?

How can I find out if an advisor is a good mentor?

You have to ask a lot of questions. Personality and style conflicts are a common reason for scientists to change labs – do as much as you can to ensure a good fit in advance. When a lab is interviewing you, you are also interviewing the lab to find a good "fit" and to ensure the PI will be a good role model and teacher. Do you admire her management style? Does he have ethical behavior? Does the lab encourage diversity? Knowing your own priorities will help in determining a good fit. Here are just a few suggestions for determining whether an advisor will be a good mentor:

- Spend time with the potential advisor and don't be shy about asking hard questions.
- Talk to as many lab members as possible. Try to get them in a setting out of the lab (coffee, lunch or beer) and in 1:1 conversations. This creates a level of familiarity and confidentiality to ensure more honest answers.

Choosing a good mentor for scientists (CONT'D)

- Ask people who work in the labs next door for their opinions. They will often have good observations and be less inhibited in sharing concerns.

- Ask alumni of the lab. Most labs have websites listing alumi and it is easy to use publication records, university websites, ResearchGate and LinkedIn to find past lab members. Most scientists love to talk about their past lab experiences and will be willing to talk by phone. Don't use email to get information if you can help it.

- Observe as much as you can in person. Rotate in the lab, if possible. Attend a lab meeting. Spend some time hanging out with members of the lab. It is a warning sign if the PI does not welcome you to visit and spend time with everyone.

Additionally, if you are looking for more resources to help you choose a good mentor, I have provided a downloadable PDF at the end of this section. This document includes a list of questions to ask your potential advisors and other related resources.

Don't ignore warning signs

If lab members, neighbors or alumni give you information about the PI that concerns you, don't just brush this away. Many scientists think, "Oh, but that won't happen to me – I am different." Unfortunately, a bad mentor can be bad news for anyone. Try to speak to them more than once to get a full picture and listen for hints at the same concerns from multiple people. Listen to what they say, and what they don't say. Scientists that are having a good experience will be quick to say so, but scientists that are struggling may hedge on their answers to your questions. Consider reading Toxic Academic Mentors by @drmellivora, an excellent blog post about workplace bullying featured on the always interesting Tenure, She Wrote blog. Unfortunately, academic bullies are hard to stop – the best thing to do is not go into their labs in the first place.

The good news

There are many excellent mentors out there. With some good pre-work you can find a lab that will deserve your hard work and an advisor that will be a lifelong partner in developing your career in science.

Further reading

1. Joannes' mentoring for scientists guide

Will you be my mentor? Finding and asking for mentoring support

By Joanne Kames | February 4, 2014

There are potential mentors all around you. In this section of the mentoring chapter, we'll cover 2 of the mentoring questions I set out to answer. First, I will describe some of the many ways you can approach finding someone to give you advice and guidance. Second, I will offer some advice on how to "make the ask" once you have found someone you admire and want to learn from.

What should I be looking for?

Be on the lookout for friends or colleagues that have the training or skills you want to learn. Mentors can be senior to you or peers you admire. If you see someone who gives a great talk, ask them for advice on speaking. If you see someone with a great professional presence, approach them for advice on what makes them that way. Is there a senior person whose career path you are interested in following? Someone you admire for their insight and way of expressing it in meetings?

The more people you meet, the more potential mentors you will identify. Finding potential mentors is one of the many reasons to always be growing your network. If you don't feel that you are an expert networker (or if you just aren't doing it at all yet) watch my webinar, "Not Networking 101-Building Relationships for Success". Choose 1-2 tactics to try. One of my favorites is making the pledge to have lunch or coffee with someone I don't know very well at least twice a week. I have done this with people I work with and people from outside my work for almost 20 years. It is good to be a bit random because you never know which relationships will take off, or who your new contact will connect you to. Sometimes, it is not who you know but who knows about you.

I found some other great tips for finding mentors in this recent blog 5 Strategies for Finding Your Ideal Mentor. One of the best was to notify your network that you're on the hunt for career advice. Your family and friends know you well and might have good ideas for who you should connect with.

Mentors at home and away

We should all have a "posse" of advisors who can help us in different ways and in diverse areas. It is helpful to have mentors from your current organization but also important to build relationships outside your organization. The mentor in your own workplace is able to:

- Help you identify specific skills you need for your current position
- Understand your interpersonal challenges if they know some of the people you work with
- Give more informed feedback (for example, they may be able to hear you present or see your work product in action)
- Can help you learn the local "ropes" and become an insider faster

Will you be my mentor? Finding and asking for mentoring support (CONT'D)

A mentor that works elsewhere is able to:

- Help identify the skills you will need to make a change
- Provide perspective on core values at another company/department
- Give more candid feedback and be able to discuss more confidential topics
- Broaden your network

Take advantage of formal programs

A formal mentoring program can be a great way to get started with mentoring. Read this Catalyst Report "Making Mentoring Work" to learn about what makes a good mentoring program. If your organization has a mentoring program, consider tapping into it and helping make it work by being an educated mentee. Other opportunities:

- Try virtual mentoring at Mentornet.net. This is an online database of mentors you can tap for email discussions. It is also a great place to practice your mentoring skills. Online mentoring can work if both parties are diligent about replying and thinking about good questions and answers.

- Professional networking groups will often have mentoring programs. The Healthcare Businesswomen's Association hosts an excellent group mentoring program in many of its chapters. Find out what other groups have going on locally.

- Your university probably has an alumni directory. Alumni who enter their information in these searchable databases are usually offering their contact information so you can tap them for advice. As a future alum, these are people you can "cold call" and ask for some of their time.

- There are many professional coaches who charge for their advice and time. Consider this option but be cautious and make sure to choose one that comes highly recommended from someone you trust. A good coach can make a big difference, if you can find one.

- Create your own peer mentoring circle. This type of program has many advantages and I am seeing a lot of success at universities around the country with groups who are piloting this. Check out the section on forming your own peer mentoring group for more information.

Asking someone to be your mentor

Mentoring is a "loaded" word. If you ask someone to be your mentor, it may sound like a big responsibility or commitment. Start by asking them to have coffee. This is much less threatening! If they say no, don't worry about it. It is a compliment to ask someone to share their wisdom and they might just not have the time. Thank them anyway and move on.

If they say yes, be prepared with questions and topics to discuss. The mentee is responsible for leading the discussion and for being "coachable". That means the mentee needs to be open to change and constructive suggestions and feedback. The best thing to do to make your mentor want to keep working with you is report back with progress. Tell them how their advice made a difference, helped you make a change for the good or resulted in a leap in your skills.

Will you be my mentor? Finding and asking for mentoring support (CONT'D)

If a first meeting goes well, you can say, "This was really helpful, perhaps you wouldn't mind doing it again next month?" Some mentoring relationships grow naturally out of friendships or work interactions. Watch for the people that are already teaching you and see if there are other ways they can help you grow. Mentoring relationships can last for an hour or for a year. Some click and some do not. These are all normal outcomes. If you have a broad range of mentors you will always have people you can turn to for help and advice.

Mentoring for scientists: I have a mentor, what now?

By Joanne Kamens | March 6, 2014

If you have been reading the other sections in this chapter, you have: realized the value of having a mentor, developed some strategies for finding mentors and, perhaps, asked someone to support your career development as your mentor. How do you make the most of this new relationship? Consider adding formality and active goal setting to your mentoring relationships, so that you can reap rewards in the form of reaching career development goals.

Add a little formality

Just getting together and chatting with another person about their career path is a great start to a mentoring relationship, but if you don't take this past the chatting stage you will rarely make any change in your skill sets or activate the helpful accountability that is one major advantage of working with a mentor. The responsibility of arranging meetings and setting the direction in a mentoring relationship falls on the shoulders of the Mentee. A Mentor will be more effective if the Mentee has done the self-reflection necessary to identify areas that need work or growth. Here are some ideas for making your meetings productive:

- Discuss logistics if appropriate: How often will you meet? How does the Mentor prefer to communicate between meetings (email, phone, etc.)?
- Make agendas for your meetings, take informal minutes on what was covered and learned, especially noting action items that are identified.
- Keep a journal to record topics, plans, findings, and progress over the course of an ongoing mentoring relationship (in a book or online).
- Mentee: Make a list of topics/skills you are interested in exploring. Mentor: Make a list of topics/skills in which you have expertise or knowledge. Where do these intersect?
- Work with resources: Choose books or articles on pertinent topics to read before your meetings and discuss these in person. See the extensive resource list available from this section.
- Use an activity to start a discussion. The Forced Choice Analysis is a fun example and you can find it in our Mentoring for Scientists Guide. You can use it to clarify and discuss values. The activity is just the start – it is the discussion after that will lead to learning.

Listen to our podcast interview with Harvard Medical School researcher Connie Cepko to learn about her mentoring style.

Mentoring for scientists: I have a mentor, what now? (CONT'D)

Set goals with a mentor - The secret of accountability

To make a mentoring relationship really productive, the most important step you can take is to set goals to work on together and track progress at every meeting. It can take many mentoring meetings to hone the goals and to make them "SMART." SMART goals are Specific, Measurable, Attainable, Relevant, and Time-bound. It is a good idea to take larger goals (e.g. Figure out what I want to do after I get my PhD) and break them down into smaller, actionable steps (e.g. Meet 10 PhDs with interesting careers, find a summer internship, etc.). It is helpful to work together on setting SMART goals using a Development Plan template. A Development Plan or mentoring journal will help a Mentee track progress, adjust expectations, and record milestones in reaching goals. The more time and thought you put into setting goals, the more progress you will make in reaching them. Of course, you won't reach all the goals you set, but the process of working on them is where growth happens.

Mentors bring more than their knowledge and teaching to help a Mentee reach goals. One of the most important contributions made by a Mentor is to help the Mentee feel a sense of accountability to complete action items and make progress. To illustrate this point, consider that I try to exercise every morning, but the temptation to skip the gym is strong. There are a few women that I see at the gym every day. If I skip, I get a bunch of text messages asking me, "What happened? Where are you?" My gym posse holds me accountable for attending and sometimes it is only the knowledge that they will be watching out for me that gets me out of bed and into my running shoes.

Be a mentor to become a better mentee

One of the best ways to become a productive Mentee is to become a Mentor yourself. If you think you have nothing to give, think again. Everyone has knowledge to impart. An undergraduate can mentor a high school student, a graduate student can mentor an undergraduate, a postdoc can mentor a graduate student – you get the idea. There are many advantages to being a Mentor:

- Learn other perspectives
- Develop coaching skills
- Encourage your creative thinking
- Enhance leadership skills
- Support inclusion, diversity, and open communication
- Feel valued by giving back

Final tips for success

Make mentoring meetings a priority. Schedule meetings or calls regularly and don't cancel, so that you drive progress with regular accountability checks. Focus on implementation of your goals and respect the time your Mentor is giving by following up on plans. Make a commitment to put time and energy into your mentoring relationships. You will only reap rewards if you put in the effort.

If you you want more great advice on mentoring, click below to download the "Mentoring for Scientists" ebook, which includes the entire series of mentoring blog posts, the "Forced Choice Analysis Activity", the "Peer Mentor Groups Guide", "Tips for Choosing a Good Mentor", and more!

IDP and your PI: A roadmap for career planning and personal development

By Mary Gearing | July 21, 2015

As we get closer to the start of another academic year, graduate students and post-docs alike are wondering where the time has gone. Are we any closer to graduating, publishing that key paper, or figuring out a career path? Many trainees are developing Individual Development Plans (IDP's) through Science Careers' myIDP tool. Using myIDP, you can identify suitable careers based on your current interests and skillset. With this information in hand, you can then formulate a plan to further develop your transferable skills and reach your career goals.

Although myIDP is great for career planning, it shouldn't be used in isolation. Without clear dialogue between trainee and PI, it's easy to miss out on beneficial opportunities or to find oneself unsure of the next steps. Harvard PI Angela DePace has put personal development at the center of her lab (pictured above). DePace holds yearly planning meetings with each trainee to create a supportive, growth-oriented lab culture. The aim of these meetings is to give honest, constructive feedback, set tangible research and career goals, and celebrate accomplishments. These techniques are laid out in Vincent et al., and are easily adaptable for use in your lab!

Promoting personal development through thoughtful planning and honest feedback

DePace's yearly planning meetings revolve around two simple worksheets, each of which is filled out separately by the trainee and PI before the meeting. These worksheets, summarized briefly below (and available of in the supplement of this paper), help each person organize his or her thoughts to facilitate honest conversation.

Goals and Planning Worksheet:

Lists accomplishments, research/professional goals and feedback.

Calendar:

Month-by-month look at the next year, including major project goals and effort needed to complete them.

These documents dictate the subject matter discussed at the meeting, but the overall tone of the meeting is almost more important. As DePace says, science is full of "terrible perfectionists," and we don't often give ourselves credit for what we have accomplished. Starting with a recap of accomplishments, from learning new techniques to finally figuring out a tough experiment, sets a positive and encouraging tone for the meeting.

Another key aspect of the yearly planning meeting is that the trainee leads the conversation. As the conversation proceeds through the various sections, the trainee speaks first for each section, preventing the

IDP and your PI: A roadmap for career planning and personal development (CONT'D)

meeting from feeling like an assessment or critique. When trainees ask for help with various issues, the PI is responsible for determining meaningful solutions.

PI-trainee communication builds a positive lab culture

Although they may take some getting used to, yearly planning meetings have tangible benefits for both PI and trainee. DePace and her lab members have noticed that the meetings make the lab run more smoothly. With a concrete plan in hand, trainees are motivated to complete their work rather than overwhelmed or confused about what's coming next. Goal setting and career planning help alleviate the anxiety of graduate and postdoc training. On the other side, the PI has an opportunity to check in with lab members, determine how to work through obstacles, and take steps to resolve interpersonal conflicts in the lab.

Yearly planning meetings may not look the same in every lab, but the principles behind this technique are beneficial for researchers at all stages. Rather than succumbing to academic inertia, it's time to develop systems that give trainees a plan, both for their time in the lab and their next steps. Addgene would love to hear about the steps taken in your lab to promote personal development - let us know your strategies in the comments section!

Further reading

1. Yearly Planning Meetings: Individualized Development Plans Aren't Just More Paperwork. Vincent BJ, Scholes C, Staller MV, Wunderlich Z, Estrada J, Park J, Bragdon MD, Lopez Rivera F, Biette KM, DePace AH. Mol Cell. 2015 Jun 4;58(5):718-21. doi: 10.1016/j.molcel.2015.04.025. PubMed PMID: 26046646.

Form your own peer mentoring group: A how-to guide for scientists

By Joanne Kames | February 18, 2014

I have been thinking a lot about Mentoring for over 10 years. Many successful scientists describe having a "posse" of mentors as one key to their success. But how do you find these elusive teachers, supporters and advisors? I tried to start a more formal mentoring program at my company, but there weren't enough senior people willing to step up and be matched with the many interested mentees. So I experimented with a group mentoring format where 1 mentor met with a group of mentees to get more "bang for the buck".

While working on this project, I read the book "Every Other Thursday: Stories and Strategies from Successful Women Scientists" by Ellen Daniell. In "Every Other Thursday," Daniell describes a group of 7 women scientists who met every other Thursday for 25 years. They helped one another navigate career changes and overcome barriers by sharing broader perspectives and holding one another accountable for their development plans. They all found the support of the group to be intrinsic to their success. Their stories made it clear to me that, executed correctly, the group mentoring format could work wonders.

I have now seen the formation of hundreds of mentoring groups through my work with the renowned Healthcare Businesswomen's Association (HBA) Boston Chapter and the Massachusetts Association for Women in Science (AWIS) mentoring programs. The groups in these programs typically consist of 1-2 mentors and 3-5 mentees who meet together for an 8 month formal program. After the formal program ends, some 50% of these groups continue to meet regularly, providing ongoing support, advice and accountability for development goals. These programs also serve as a great first-time mentoring experience. They make mentoring less mysterious and train the participants in skills useful for future mentoring relationships.

If you would like to start a group mentoring program at your organization, contact me! I can provide a step-by-step guide, and am happy to advise.

Advantages of the peer mentoring format

- Adding peer advice increases the diversity of input and perspectives
- Provides a good mechanism for accountability that makes mentoring effective
- Goal setting is easier with more perspectives contributing to the process
- Senior people (of which there are never enough, especially in underrepresented groups) reach multiple mentees efficiently
- Allows all group members to lead and learn at the same time
- Broadens the network of the participants
- Can be a lot of fun!

Form your own peer mentoring group: A how-to guide for scientists (CONT'D)

Advantages of the peer mentoring format

In my travels speaking to grad students and postdocs I have started to talk to trainees more about peer mentoring. They want to find mentors to help them develop their skills and to hold them accountable for their development plans. However, they find it awkward to ask someone for the time commitment of a formal mentoring relationship or there aren't enough senior mentors available to go around. My advice has been to find 5 interested peers and form your own peer mentoring circle. In a Peer Mentoring Group all participants act as both mentors and mentees. Because the participants are at a similar development stage, they have a lot to learn from each other. Some have taken my advice and I recently heard from peer groups meeting at both the Fox Chase Cancer Center and Brandeis University.

5 Easy Steps to Forming Your Own Peer Mentoring Group

1. Find 5-8 colleagues that you think might be interested and willing to commit to the group. The group can be one gender and career stage (e.g. all women, all men, all postdocs, all grad students) or mixed for one or both of these criteria. If you can, include people from different labs, departments or organizations as it brings a diversity of perspective. Sometimes it is helpful to find peers that share a similar direction or problem. For example, a group of people who are all interested in making a transition.

2. Schedule your first meeting and get organized. Discuss your general areas of interest and what you want to cover during the year. Suggest that each person bring 3 topics and write them on a board to see which ones get the most hits. Commit to a meeting schedule and meet regularly no matter what, even if one person can't make it. One of the biggest group mentoring predictors of success is actually managing to get together. If you all work at the same place, a 1-2 hour lunch on a regular schedule might work. If not, perhaps a 3 hour breakfast once a month. All participants must commit to making the meetings a scheduling priority (and last minute lab emergencies are no excuse).

3. Assign each meeting a leader from the group in a rotation. The leader for that meeting is responsible for choosing a topic and leading the discussion. This is a chance to practice leadership and communication skills. The leader also provides materials such as pre-reads, videos or exercises to be completed in preparation for the meeting or to be read or watched during the meeting. Scientists do better with process, so don't just get together and chat. Have an agenda and get everyone ready for the discussion with resources. One of the most common questions I get is, "What are we going to talk about?" There are an infinite number of ideas on the internet, but start by downloading my handy list of suggestions.

4. Get started. Have regular meetings. Experiment with the process. Have each person write a Development Plan. Set concrete goals with input from the group to make the plan better. Track your goal progress as a group. Practice your job talks for one another (trainees never get to present formally often enough) and give honest, critical feedback for improvement. Go to a science or career seminar together and meet to debrief on the topic (career) or presentation style (science). Have a potluck dinner. Invite guests from a lab, career or industry of interest – learn about their career paths and get their advice. Attend a local networking event together and help each other practice meeting people – compete for fastest to set up a coffee date or most cards collected. T

5. Celebrate your successes and support each other as you transition to the next stage in your careers! Stay in touch...this group will be the core of your network for years to come.

Form your own peer mentoring group: A how-to guide for scientists (CONT'D)

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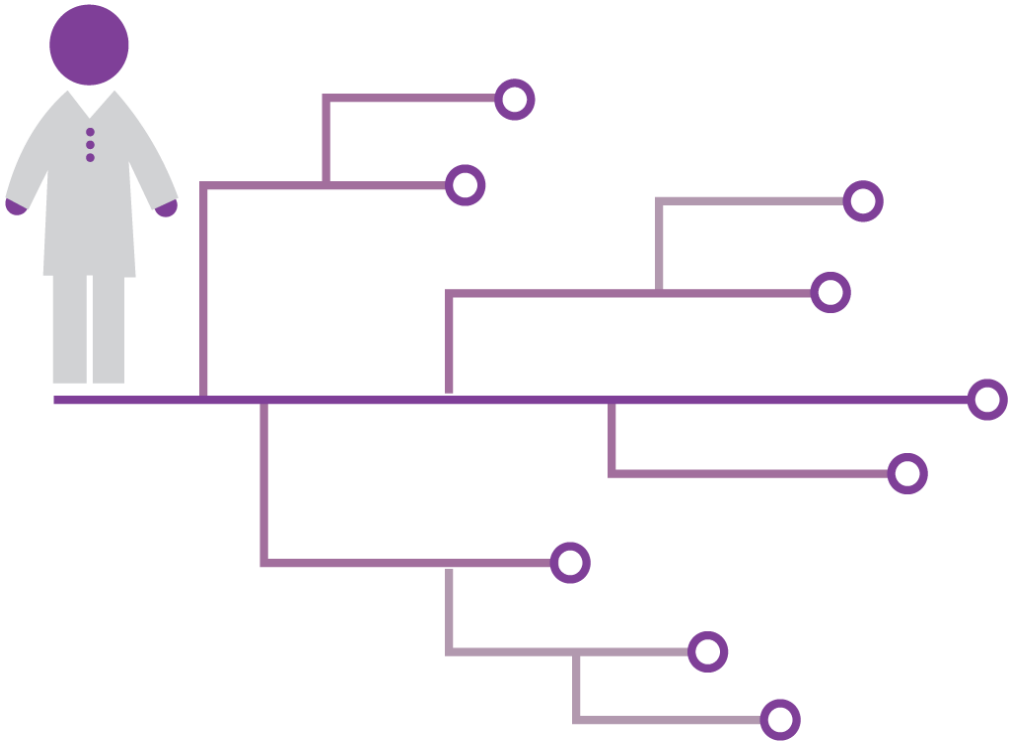
Chapter 3

Science career options



Science career options

By Emma Markham | February 23, 2017

When preparing to graduate from university, many students are confronted with the question 'what now?' This is often a hard question to answer if you plan on leaving academia, but don't quite know what you do want to do or even what careers are available to scientists. It is all too easy to get tunnel vision when working towards a specific goal, and when you realise that your goal might not lead to a career you actually want, you can feel lost. Use this post to explore the wide range of careers available to scientists and open your eyes to the many opportunities available to those who are scientifically minded!

Science career divided by the most pertinent skills

Research skills

The ability to think critically and carry out in-depth research is applicable to a wide range of industries and is a highly desirable quality sought after by employers. These skills show employers that you can fully investigate and solve a problem or complete a project, overcoming inevitable failures and setbacks. There are many roles that actively require these skills, including:

Science reporter	Scientific sales	Epidemiologist
Scientific recruitment	Meteorologist	Research and development
Healthcare consulting	Lab manager	Patent lawyer
Science market research	Statistician	

Attention to detail

Patience, accuracy and attention to detail are valuable skills acquired from a science degree that can be applied to many roles. These types of skills show that you fully explore the different options available and then decide on a course of action. Instead of rushing in, you take steps to make it more likely you'll get your tasks done correctly the first time. These skills are very desirable to employers because they save time and money and make employees more productive. Careers where you'll actively use these skills include:

Science reporter	Scientific illustrator	Patent lawyer
Scientific advisor	Lab manager	Journal editor
Technical writer	Meteorologist	
Textile technologist/designer	Research and development	

Science career options (CONT'D)

Fieldwork and traveling

Many people are attracted to science because they enjoy spending time outdoors and with nature. Experience in the field or in a position that requires travel can show that you are self organised, reliable, and can work independently. Practical outdoor skills are needed in a variety of roles, including:

Livestock breeder	Scientific illustrator	Nature photographer/artist
Zoological worker	Conservationist	
Parasitology	Botanist	
Ecologist	Plant breeder	

Computer and writing skills

Writing a thesis or dissertation demonstrates that you have advanced writing and formatting skills, which are useful to many employers. Increasingly, computer skills are highly desired, as roles are becoming more reliant on technology, and good computer skills will give you an advantage. Strong writing, computer skills (Word, Excel, PowerPoint etc) or Programming skills (Python, R, SAS, HTML, Matlab etc) are highly desirable in a range of roles, including:

Science reporter	Technical writer	Statistician
Bioinfromatician	Science writer	Grant writer
Journal editor	Science marketer	Software developer

Don't stumble into a career, do your research

Once you have identified possible careers, the next step is to research what each of these roles involves on a dad-to-day basis. Often, it is hard to know what a job title actually involves, other than what is portrayed in the media and in films, which can often be misleading. Key aspects to determine are working hours (9am-5pm Mon-Fri or overtime and weekends, part time or full time) and what life is like for someone who currently in the position. Questions you'll want to find answers to include:

- Will you be sitting at a desk all day or be on your feet constantly in a lab?
- Will regular travel be required or will you stay in one location?
- How long is the commute?
- Will the job require public speaking?
- Will you be leading a group or working as part of team?
- Will you be coordinating projects?
- Do you need computer programming skills?

Other things to consider are wage, opportunity to advance, and how many jobs are normally available (as sectors such as forensics currently have too many applicants compared to the number of available roles).

Science career options (CONT'D)

Make your resume stand out

Before you begin to apply for a job, it is useful to search online job websites to see what requirements or qualifications are needed for the role, as this will give you an idea of what additional training you might need to obtain. You'll also need to think of other aspects of yourself that make you stand out. For every role you need to show that you have the relevant skills and experience.You might not normally think about it, but hobbies and volunteer experiences, as well as work history can really show that you have some of the abilities listed above. Showing that you are willing to exercise these skills outside of a formal work environment also shows that you are passionate and capable. For example if the job involves traveling, showing that you are a highly organised and experienced traveler by citing specific examples, may help you get your foot in the door. Match the job's requirements to the content in your Resume and Cover Letter. Include any relevant job specific 'buzz words' to ensure recruitment agencies and employers put your resume forward for the role, because it 'ticks all the boxes'.

Once you've assessed your skill set and done your research, it's time to start sending out applications. Check out other sections of this eBook for advice on crafting the perfect application.

Science career options (CONT'D)

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What do I do now? Academic v. non-academic career options

By Joanne Kamens | March 9, 2017

One of the less acknowledged perks of scientific and technical training is that these educational paths prepare you for a vast selection of career options. Scientists are certainly following many diverse career paths these days. A recent National Science Foundation study showed that 57% of PhDs in US Biomedical workforce will NOT go into "traditional" academic positions. More recently, I have been hearing exit survey data from postdoctoral programs in the Boston area that demonstrate that 85% of leaving postdocs pursue a career outside the traditional academic silo to tenured professor. Non-academia encompasses many choices including pharma, tech transfer, management consulting, science communication, policy and the diverse options in nonprofit science. No one list can ever encompass them all. We can't designate non-academic jobs as "alternative" anymore.

Since most scientists start out in academia, it is especially important for graduate students and postdocs to get a perspective on other types of science careers as their training progresses. In From Academic Solos to Industrial Symphonies, an article well worth reading on this topic, the authors state:

"Both explicit and implicit aspects of today's postdoctoral training can directly interfere with a seamless jump into industry."

In his article On Leaving Academe, Terran Lane is asked by his colleagues and friends why he would give up,"an excellent—some say "cushy"—tenured faculty position for the grind of corporate life". In fact, there are a lot of good reasons to stay and good reasons to go. Here are some questions and perspectives to consider.

Some Questions to Ask Yourself...

- Are you a confirmed "individualist"?
- How do you feel about movement geographically and topically?
- Do you have to consider diverse careers to stay working and co-located with your partner/family?
- Do you want to focus on training the next generation of scientists?
- How structured is your approach to time management and work/life negotiation?
- Love science but not interested in bench work (or maybe you just aren't so good at bench work)?
- Do you want to focus on being closer to technologies that are actually used to treat patients?
- Is the idea of supporting your lab with grant writing something you are ready to pursue?

What do academic and non-academic careers in science have in common?

- You can do quality science on interesting topics
- Having strong non-science skills is important for success
- Must always justify use of resources and pay attention to budget constraints
- Academic science is much like industry but the "product" is publications—the pressure to produce is the same
- You get to interact with scientists just like you

Check out differences between academia and non-academia on the next page.

What do I do now? Academic v. non-academic career options (CONT'D)

What is different about academia?

- Publishing in peer reviewed journals is absolutely necessary for success
- One can experience a greater sense of autonomy - there are fewer outside influences on your topics of research or course of action
- One can focus on science for science's sake
- More opportunity to train and teach students
- Collaborations may be less "complicated" - for example, easy to initiate a collaboration without having to worry about proprietary information
- Work hours are long, but there is more flexibility with the academic calendar
- Academic researchers must be extreme self-starters and especially good at self-promoting—No one is going to tell you to pick up the pace
- Constant worry about grants and renewals

What is different about non-academia?

- Scientific publications are a nice to have, not a need to have
- Must be ready to change projects frequently with little notice or choice
- Always working on a team/in a matrix - can be frustrating for solo flyers
- Other people will routinely scrutinize your data—science can be surprisingly more rigorous in industrial settings
- Tight (sometimes impossible) timelines—others are usually waiting
- Work is concentrated to business hours (mostly), but can often achieve more structured time management conducive to work/life scheduling
- Diverse opportunities to do science related jobs that require no bench work
- Better resources available ($)—can outsource a task to someone else who can do better, no grant writing
- Job changes can happen regularly (every 4-6 years is common), but this can also bring new opportunities—projects end and layoffs occur, but good performers move around easily

How can you make a decision about something like this without sufficient data? Starting to learn about the diverse options and how to take advantage of them early is one way to smooth your path to a fulfilling career. Building your network so you can talk to scientists following diverse career paths is an important first step. Developing mentoring relationships, especially with peer mentors, to discuss your strengths, weaknesses, interests and passions is another great way to shed light on what paths to pursue.

Spend some time really thinking about your motivations and what parts of being a scientist you enjoy the most. Having a better idea of where you want to go will help you focus on the transferable skills that you will need to get there.

Check out the table comparing big and small companies on the next page.

What do I do now? Academic v. non-academic career options (CONT'D)

Table 1: Taking it a step further - Big company v small company

Big (e.g. pharma)	Small (e.g. biotech)
Develop expertise areas quickly	Jack/Jane of all trades
More sources of training and resources within the company	Must find own sources of knowledge often externally
A bit less crazy	Crazy hours (really)
Can have a long term career with advancement in one company, good performers in for the long haul	Limited movement in one company, likely will need to move around every 3-6 years—a short and exciting ride
Complicated matrix structures are common	Small integrated teams, little hierarchy
Real diversity and acceptance can be an issue in getting promoted (especially race and gender)	Interpersonal issues can create interpersonal issues (one bad apple can change entire culture)
Specific requirements for hiring more common	Likelier to hire on general talent and not specific skills
<- Can move between the two (helps to know the right people) ->	

Career insights: Technical support specialist

By Klaus Wanisch | November 9, 2017

Skills required

- Specialist lab experience and broad scientific knowledge (at least MSc or PhD level)
- Analytical and problem solving skills
- Good communication skills and positive attitude/patience
- Language skills may be an advantage

Pros

- Easy transition from academic lab to industry
- High chance of being a rewarding role
- Relatively stable jobs
- Good starting point to develop into other roles

Cons

- Not much day-to-day variety
- Not the most prestigious role
- Can come with a high workload at times

A degree in the life sciences prepares one for numerous non-academic careers. Still, many start their scientific careers hoping to follow the traditional academic route (find tips for getting a faculty position here). Possible roadblocks only become obvious at rather late stages (i.e. postdoc level) and can include the pressure to publish in high-impact journals, and the requirement for a high grant success rate. At this point, candidates are highly experienced but often have to start pursuing other options.

While some non-academic career options require additional study for late career scientists to become more appealing on the job market (e.g. a postgraduate degree in law, an MBA, or similar), there are many roles out there that require exactly what life science PhDs can offer: vast practical lab expertise, experience in different scientific fields, and knowledge of how to troubleshoot problems at the bench. Specifically, roles in technical support make excellent use of the skills developed by life science PhDs.

In my days as junior postdoc I was aware that such roles existed, but did not consider them for myself. I started picturing myself in a technical support role only when I was confronted one day with a product issue in the lab. The issue was with a custom-made reagent to manipulate cells (manufactured by one of the larger biotech companies), and as far as I remember, it was the first time that I was absolutely convinced it was the company's fault. I contacted them to express my concerns and request a replacement. I got my replacement in the end and the issue was resolved - but it was a rather painful to get there: I had to send the company detailed documentation of my results, answer loads of questions, and I also had to do some troubleshooting as advised by the technical support person. This delayed the progress of the project.

After that rather unpleasant experience I thought: I could do this job so much better. Driven by that, I successfully applied and worked as a technical support specialist for 4 years. Read on for insights from my time in technical

Career insights: Technical support specialist (CONT'D)

support including tips, advantages, and disadvantages of this overall rewarding role.

Learn about other Addgenies and their careers in our career videos.

What's required for a role in technical support?

It takes some time (several years) to build up comprehensive lab experience. With this valuable training behind you (and largely only that is necessary), there are opportunities to work for biotechnology companies and help other researchers use the company's products successfully. In technical support you may have to answer technical enquiries such as:

"Can I use this product under conditions different from those specified on its data sheet?"
or
"Do you have additional data regarding the specificity of this antibody?"

You will also help troubleshoot products, give general experimental guidance, and resolve complaints about products.

As you might expect, different companies produce different products and therefore need people with different areas of expertise in technical support positions. When applying for technical support positions, you should try to match your expertise with that of the company. To increase your chances at successfully applying for a position, you should familiarize yourself with technical support. Even having personal experience with technical support through the customer's perspective is good. If you've never participated in a customer support conversation, just go ahead and contact a technical support team with a question or two that open a dialogue. This will give you a feeling of what might be involved in such a role. In addition, it can be advantageous to speak multiple languages - that makes communication with customers from around the world easier. You should also demonstrate a strong willingness to help others with their problems, a general positive attitude, and an open-minded personality.

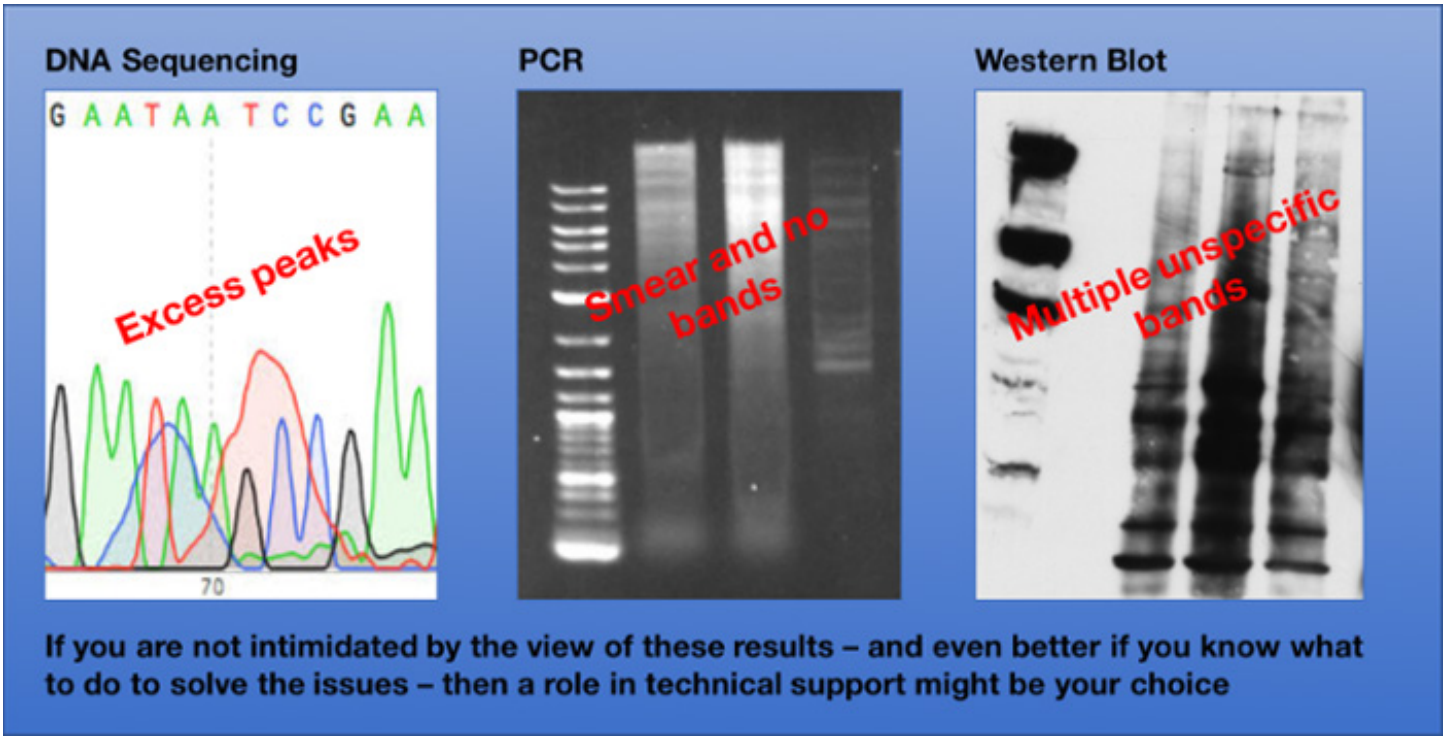
These traits will help you deal with any incoming requests or problems - there is considerable diversity in the types of questions customers ask, and there are also differences in customers' personalities and their expectations. If you are willing to listen to a customer's concerns and are patient enough to find the real issue, you will do well in a technical support role.

What general characteristics do jobs in technical support have?

There are different names for technical support roles. Examples are Technical Service Representative, Technical Support Specialist, Technical Support Advisor, Technical Correspondent or similar. While there isn't a clear distinction between these job titles, they may be different regarding the levels of lab experience and scientific knowledge they require. Biotechnology companies vary to what extent they hire experts for their technical support, and a PhD is not always necessary. The job description and the candidate requirements (and maybe also the proposed salary range) should help.

In smaller companies, technical support is often covered by the lab based team as part of their general job duties. Bigger companies have dedicated technical support teams, sometimes comprised of several layers of

Career insights: Technical support specialist (CONT'D)



support: A front-line team accepts any incoming requests and answers questions that are less time consuming and/or less technically challenging. Alongside there is a second-line team that takes on cases requiring in-depth analysis, data review, in-house testing etc.

Technical support roles are primarily office based, and email/phone are the most popular ways to communicate with customers. Online live chat is a convenient alternative for asking a quick question or making initial contact, but is less suitable for troubleshooting or issuing replacement products. In order to find good and helpful answers for customers, internal resources and databases are scrutinized, and this information is enriched with your technical knowledge and judgement. For particularly tricky cases, team discussions can often lead to otherwise unobtainable solutions. To some extent there is the need (or opportunity) to get involved in product testing in the lab, to travel to customers' sites, and to run experiments with/for them.

Though not the most prestigious role in a company, Technical Support is essential for success. For possibly this same reason, it can be one of the more constant and safe corners in a company, less exposed to the fast dynamics and pressure which are often found in sales or lab-based roles in industry.

What to look forward to in a technical support role

Talking to customers everyday, it can be fascinating and exciting to listen to the many individual stories and get (sometimes refreshing) insights into how other scientists think and work. Most certainly there won't be a shortage of amusing reports where someone tries to "optimize" a particular standard lab protocol. For example, someone may attempt super quick incubation times in a Western Blot protocol and then blame the antibody when no signals are obtained. Or someone may heat an ELISA plate during incubation steps in order to enhance

Career insights: Technical support specialist (CONT'D)

the OD signals and then complain about high background.

In many instances, variations of the product's specific application instructions or "optimized steps" can be linked to having actually caused the problem. It may not always be straightforward to identify those crucial details because there are just so many things which can go wrong in a lengthy protocol. And customers may tell all sorts of details about the application, just not the ones that matter. Therefore, if there is a bit of a Sherlock Holmes in you – a technical support role is the right place to live it out, but ideally without asking too many (annoying) questions. Identifying and solving problems are the most rewarding parts of the job. Solutions may also be achieved by simply replacing the product in question. This can solve the problem in a simple way even if you don't exactly know why.

Personal and professional development in technical support roles

A job in technical support can add a variety of skills to your CV and lead to other job opportunities (though it is not uncommon for someone to stick with technical support for the long term). First and foremost, technical support gives you the opportunity to develop interpersonal and communication skills. Problem solving and analytical skills are prerequisites but these too can be enhanced on the job.

When dealing with customers, you must be polite, friendly, patient, attentive, empathetic, and tactful. Occasionally it can also be necessary to take the lead and be assertive. You develop an understanding of when to use these communication skills by working with people from many different backgrounds and realizing that the same approach does not work for everyone. The benefit is that these skills are highly transferable and will help you enter other roles in project management, consulting, scientific outreach, and more.

Technical support roles also involve interacting with other departments such as research and manufacturing, quality assurance, product management, marketing, and sales (to name a few). Depending on the particular company structure you may be able to move into one of these departments from technical support.

Technical support careers in brief

Technical support careers are open to experienced professionals with strong interest in the technical aspects of science and the drive to help others. These roles offer an easy transition from an academic lab to industry without being too commercial or "sales-y". The work includes reviewing customer data sets, troubleshooting protocols, analyzing information, and solving customer problems. Technical support can be highly rewarding but can also be a good jumping off point for other roles in industry.

Careers in science communication: Science writing

By Beth Kenkel | October 3, 2017

This series was written for selfish reasons: I wanted to learn about careers in science communication. When I started my Science Communication Internship with Addgene, I didn't know a lot about scicomm, but had enjoyed writing a few Addgene guest blog pieces. Throughout my internship, my interest in scicomm has grown and now it feels like an awesome bionerd hobby but also a viable away-from-the-bench career option. So if you're interested in learning more about science communication careers, you're in the right place. For this series, I'll interview three science communicators who work in the biotech, education, or nonprofit industries.

Hans Packer - Science writer

When Hans was finishing up his PhD in Molecular Neuroscience at the University of Iowa, he was like a lot of newly minted PhD's: not sure what his next step should be. He debated taking a position as an application support/sales representative in industry or a postdoc in academia, but knew that, without a doubt, he enjoyed writing. With a bit of luck, he landed a job as a Science Writer at Integrated DNA Technologies (IDT). "It was fairly accidental. I was finishing graduate school, and didn't have anything lined up when a good friend, who was a science writer, reached out to me. She was leaving a writing position and looking for someone who might take over. I like writing and science, so I took a chance."

> I LIKE WRITING AND SCIENCE, SO I TOOK A CHANCE.

It's been six years since Hans took that gamble, and it's paid off. Work is never boring. "I just keep learning on the job. It keeps it interesting." And while his official title may be science writer, writing is just the one of the skills Hans uses for his job. "I am really more of a multimedia science communicator than a science writer these days. I do some public speaking and a bit of video work for webinars (get tips for your next science talk). I do illustrations for summarizing mechanisms and applications that are relevant to things IDT does. I also work on our website quite a bit."

Out of all of these tasks, webinars are Hans' favorite thing to work on. "It's one of the most challenging [parts of my job], so making it a success feels like a real accomplishment." He started working on them shortly after joining IDT when his boss was looking for someone to take over hosting them. Since then, webinars make up a larger part of Hans' workload. "I am currently getting abstracts and plans together for my next 4 webinars—I have them stacked close together for the next couple of months. This involves a lot of communication with the presenters, and editing of abstracts and speaker biographies."

> PERHAPS THERE ARE EXAMPLES OF SCIENCE WRITERS WHO CAN GET EVERYTHING THAT THEY NEED JUST FROM READING UP ON A TOPIC, BUT I HAVEN'T MET ANY.

During the week of our interview, Hans was also busy preparing materials for an upcoming product launch. "The writing group I am part of is responsible for checking the scientific accuracy of everything that goes on our website. We look at product pages, performance data, protocols, and even certificates of analysis."

Han's biggest piece of advice for those looking to break into the field of science communications-- Be able to talk with people: "If you do this for a living, science writing will take you out of your realm of experience. I am

Careers in science communication: Science writing (CONT'D)

away from the bench now, so I have to talk to other scientists when I am in new territory. Perhaps there are examples of science writers who can get everything that they need just from reading up on a topic, but I haven't met any." A few other tips: "Learn HTML, write a lot to make sure you don't hate it, and be flexible. The best stuff that I do is not what I was hired to do."

JARGON IS A KILLER FOR SCIENCE LITERACY.

And when asked what tips he has for better science communication for non-scientists: "Jargon is a killer for science literacy. If people have to understand a lot of big words to access what you have written, they will never get off of the ground. So limiting that, and defining a couple of key terms is a better approach. Also, appealing images and colors draw people in. Drawing a picture of a mechanism that also looks nice is a great way to bring people in."

Careers in science communication: Product development

By Beth Kenkel | October 18, 2017

In this section from our Careers in Science Communication blog series, you'll learn about Caitlin Runne-Janczy, a Product Development Manager at eScience Labs, an educational company that creates hands-on science lab kits and digital curricula to support them. Caitlin's interview is broken into two parts, with part one detailing how she got into scicomm and part two focusing on what her job at eScience Labs is like.

Caitlin Runne-Janczy: Part I

Caitlin Runne-Janczy, a Product Development Manager at eScience Labs.

Writing is a lifelong hobby for Caitlin Runne-Janczy. "I wrote reports for fun in fourth grade because I was weird like that," says Caitlin. A love of teaching also runs through Caitlin's blood. "I come from a family of educators, mostly elementary school, middle school, and high school. I'm the only science person of the bunch. They don't really know where I came from." Working at eScience Labs, an educational company that creates hands-on science lab kits and digital curricula that support these kits, is the perfect blend of these two passions, or as Caitlin put it, "I get a little over-enthusiastic when it comes to the labs."

While her love of educational science writing is clear, Caitlin's career plans weren't concrete when she finished grad school at the University of Iowa. "I left not really knowing what I wanted to do, but knowing that I wanted to leave the bench." Her path to figuring out her career plans was paved with lots of writing, hard work, a slight detour, and a bit of luck. This journey started not at the end of her PhD but rather at the beginning. "When I was at Iowa in the Department of Pharmacology, I taught a couple of lectures in the undergraduate pharmacology course, like one or two lectures a year. And then in my final year of graduate school, I actually served as the student course coordinator. With the guidance of one of the faculty members, I helped grad students who were teaching for the first time. I walk[ed them] through their lecture, giving them advice, [and helped] proctor exams."

> **I WROTE REPORTS FOR FUN IN FOURTH GRADE BECAUSE I WAS WEIRD LIKE THAT.**

These teaching experiences led Caitlin back to being a student when she signed up for a 10 week class at Iowa called "Teaching Your Research." This course has participants take their research from the bench to the classroom by creating the outline of a college level course based on their research interests. "So for me, I researched G-proteins at the time. This program takes what you know about it [your area of research], and teaches you how to design a course, how to design good lesson plans, how to design test questions, and how to design lectures. I really built a course from the ground up."

Science writing and editing

These teaching experiences definitely weighed in Caitlin's post-grad plans, but in the end, writing won out. "I considered teaching at a liberal arts school but I've always enjoyed writing." In the short term though, she did a one year postdoc in the Biochemistry Department at Iowa, but kept up a freelance writing hustle on the side. "I actually stumbled upon, about 6 months in, this opportunity to do scientific editing." It was for Cactus Communications, a company that provides scientific editing services. "I was working during the day and editing at night. It was not the easiest 6 months. But it gave me the foundation to be a much better writer."

Careers in science communication: Product development (CONT'D)

At the end of her postdoc, Caitlin had a clearer idea of her career goals: "My plan was to go into editing journals. I really enjoyed the writing and editing sphere." But things aren't always that simple, especially when your spouse is also in science. "It ended up we moved to Colorado for my husband's postdoc. Colorado is growing in the biotech sphere, and growing in the science sphere, but the journals aren't out here. They're really East Coast. When we first moved out here, I was still editing from home and looking for a job." But Caitlin's persistence paid off: "I spent about 6 months just editing and searching for a job and I stumbled upon eScience by luck, by chance, by complete happenstance. It was on Indeed or one of the job search sites. It's a rare trek these days to go in cold turkey for an interview and not know anyone. I say I'm the anomaly because I didn't network to get to where I was. It was really luck of right place, right time, and having a good interview experience." Although luck wasn't the only factor in Caitlin landing her job. All of the hard work she'd put in outside the lab had paid off. "The combination of the editing and teaching experience that I'd had at Iowa really opened the door for me at eScience."

Careers in science communication: Product management

By Beth Kenkel | November 1, 2017

In this section from our Careers in Science Communication blog series, you'll hear more about Caitlin Runne-Janczy and her job as a Subject Matter Expert/ Product Development Manager at eScience Labs. To learn how Caitlin got into scicomm and landed her first post-grad school job, head over to part I of the interview.

Caitlin Runne-Janczy's first day at eScience Labs was not your typical first day. "I walked in and they asked me, 'How do you feel about dissecting a cat?' And I'm like, 'Well, I'm here so let's do it!'"

Caitlin Runne-Janczy, a Product Development Manager at eScience Labs.

Working as a subject matter expert

Caitlin started out as a subject matter expert (SME) at eScience Labs, an educational company that creates hands-on science lab kits and digital curricula to support them. Caitlin's take on her job as an SME: "I write curriculum for students taking science courses online, which is a blast. I have so much fun doing that." Being an SME is often like being a jack-of-all-trades. "As a subject matter expert in the educational sphere, it can range from researching an area, to writing an introduction that gives a basic overview of kinematics in physics, to developing a lab about mitosis and meiosis in biology. Lots of it is researching the different aspects of the subject you're writing and then condensing that and making it accessible to students." Making science approachable is often the most challenging part of the job, but Caitlin doesn't work in isolation. "A lot of what we do is work with students who don't have a science background. [We ask them,] 'Can you read this lab. Can you test this experiment? Can you follow and understand the protocol from start to finish?'" says Caitlin.

> MY VERY FIRST DAY AT WORK, I WALKED IN AND THEY ASKED ME, "HOW DO YOU FEEL ABOUT DISSECTING A CAT?"

SME's at eScience Labs also write test question banks, case studies, and experiments for labs, in addition to testing those experiments. "We also do videos demonstrating an experiment or a technique to students, like how to pour a gel [for] electrophoresis or doing a dissection video. I did that in January. This involves going in front of a camera and kind of walking them through the steps of, for example, cutting open a heart to look at the inside. We do a lot of interactives and videos, as well, to supplement the hands-on [aspect of the labs]," says Caitlin.

Caitlin also works to meet the individual needs of schools interested in using eScience Labs as part of their curriculum by either taking existing curriculum and customizing it for schools or developing new online courses about unique topics that aren't already offered by eScience Labs. "We work with faculty members to make sure the courses encompass what they want to teach."

Besides working with students and faculty, Caitlin collaborates with the sales and operations teams at eScience Labs. This can involve traveling with the sales team to meet faculty and introduce the kits to clients who might initially be doubtful of online science lab classes. However, their opinions are often changed after seeing a kit for themselves. "You open up the box and there's a gel electrophoresis tray in there. Or the dissection specimens." Since the eScience warehouse is onsite, Caitlin can visit the operations team to make sure "that everything that's going into the kit is going to work and give the student the best possible experience."

Careers in science communication: Product management (CONT'D)

Moving into product management

About a year after Caitlin was hired, she was promoted to Product Development Manager and now manages the entire curriculum development team at eScience Labs. She still gets to write curriculum, but has taken on other new and exciting responsibilities."I'd say maybe 25% of my day is still what I did as an SME, and then 75% of the time I'm kind of the go-to person for my department." Caitlin does this by acting as a facilitator between her team, the sales department, and operations department with the ultimate goal of determining if projects are feasible. This involves thinking about kit cost and safety.

MY RECOMMENDATION WOULD BE ANY OPPORTUNITY IN THE LAB OR OUTSIDE THE LAB: WRITE!

Being a manager also requires Caitlin to look at the big picture: "It's been really cool to take a step back and look at new technologies in education and ask 'Can we implement that?' [And think about] where we [eScience] are going to be in two, three, or four years down the road to keep being at the very top of the business."

Caitlin's advice for budding science communicators: "My recommendation would be to take any opportunity in the lab or outside the lab: write!" Caitlin did this by editing 15+ comprehensive exam proposals, a few PhD theses, and occasionally posting something science-related on Facebook. "I think this helped me say with confidence when I interviewed, 'I write science. I edit science. And I do it well.'"

Careers in science communication: Writing for a research institute

By Beth Kenkel | February 2, 2018

In this section from the Careers in Science Communication blog series, you'll hear from Susan Keown, a staff writer at the non-profit Fred Hutchinson Cancer Research Center.

Susan Keown's science communication journey started with something unexpected: termites. "I was really interested in the evolution of social behaviour in social insects, obviously as all people are," says Susan. Her passion for insects lead her to start a PhD in entomology at the University of Maryland College Park, but she quickly realized it wasn't the place for her. "I went to grad school with the plan of being a scientist. I pretty quickly figured out that I just don't have the patience to be a scientist," says Susan. After coming to this realization, Susan panicked. She had always loved science, but didn't know what she would do if she wasn't at the bench. "I was literally sitting in my office one day, which I shared with a postdoc, and I'm like, "Oh my god, what can I do?! This is a mistake! Why did I even come [to grad school]!" He asked if she had considered other careers, which she hadn't. He then said, "How about being a science writer?" to which Susan replied, "What's a science writer?"

Learning about SciComm by doing SciComm

Writing had always been a strength of Susan's, but she didn't know if she liked science writing. She decided to start a blog to test it out and discovered she not only loved science, but also science writing. "And since I was still in grad school, I had the opportunity to take a course through the school of journalism on science journalism." She also interned two days a week on a public radio show. After graduating with a master's, Susan completed a science writing internship with the National Eye Institute (NEI), where she wrote about NEI research for a general audience. She then got a full time position with a Washington D.C.-based communications consulting firm, Palladian Partners. "I was lucky to have been able to make that transition really smoothly," says Susan.

> **I STARTED GRAD SCHOOL AND I PRETTY QUICKLY FIGURED OUT THAT I JUST DON'T HAVE THE PATIENCE TO BE A SCIENTIST.**

After being in D.C. for a few years, Susan was ready for a change of scenery. She moved to Seattle and continued working for Palladian Partners remotely, but started looking for a new job because "it kinda sucked to work remotely. I was also tired of the contracting life where you do a little bit of work for one client and then switch to doing something else. You're never really integrated and part of a team." It took her two years to find her current position at Fred Hutch because her skill set wasn't matching up with the local job postings. "There were jobs that I didn't seem to have the right skills for in terms of PR types of things or communications planning." To beef up her resume, she decided to complete a certificate in Strategic Communications and Public Relations at the University of Washington and the connections she made through this program lead to her current job. "One of my colleagues in the class was like, "Hey Susan. I saw a job that I think is up your alley. It's at Fred Hutch." And I hadn't seen it. So I applied and I got it."

> **THE POWER OF A STORY IS TO MAKE A HUMAN CONNECTION WITH A READER.**

Careers in science communication: Writing for a research institute (CONT'D)

Science writing at Fred Hutchinson Cancer Research Center

Work as a Science Writer at the Hutch varies, with no two days being alike. At the time when we spoke, Susan was helping cover social media while the Hutch hired a full-time social media manager. "I usually start out my days looking through our Twitter feeds and dealing with social messages and postings," says Susan. There are also team meetings and Susan is assigned to cover the Clinical Research Division at Fred Hutch, so she attends that division's scientific seminars a couple days a week. And there there's always plenty of writing: plain-language stories about Fred Hutch research, pieces for donors such as fundraising materials and progress reports, in addition to articles for the Fred Hutch website, social channels and Hutch magazine.

Getting pulled in all of these different directions is sometimes at odds with the space needed to be creative. "You need a lot of time to let you mind process things. Sometimes finding that uninterrupted time to be creative is challenging," says Susan.

Getting Started with Twitter

It's ok to be a lurker: "It's good to find people who are in your niche that you think are doing Twitter well and just watch them to see what they do."

Write multiple different social media share lines, i.e. use multiple different hooks to catch readers attention.

A smart use of hashtags is key. Many cancers have strong communities on Twitter. Example: Tag a breast cancer story with #bcsm, which is breast cancer social media, to make it easier to find.

To find hashtags, use tools like Symplur. Or just search for a hashtag on Twitter to find ones that are popular

Active listening is key: Read tweets that you are mentioned in. Retweet things that are relevant. Build a conversation by responding and engaging with people who comment on your tweets.

Another difficulty is that some articles are just harder to write. "There's something about being a writer that can be a very painful process. And certain stories can make you feel like 'I'm a terrible writer. I have never written anything good. And I will never write anything good again.' " For Susan, one of the most satisfying parts of the job is having completed one of these difficult pieces: "It's probably the best."

Besides working through the tough assignments, the skills that Susan finds important for her work include: "Listening. Evaluating evidence. Critical thinking. Being able to learn things quickly. Story telling. The ability to know what's a story and how to hook your readers with it." She feels that storytelling is an impactful tool for science communicators. "The power of a story is to make a human connection with a reader, whether it's a scientist or someone who's affected by climate change or affected by a superbug. I think we solve these problems through connections and that's something that good storytellers in science can do."

Susan's number one piece of advice for getting started in science communication: "Find as many opportunities as you can to get your name on things." Susan personally found this easier to do while still in school since opportunities, such as writing for a student-led publication, are more readily available and it's often easier to accept unpaid work as a

Careers in science communication: Writing for a research institute (CONT'D)

student. For post-grad school individuals, Susan recommends starting a blog, but with one caveat: "I hate telling people to work for free because you shouldn't work for free." Susan also suggests volunteering to write for a non-profit, like she did for the Northwest Association of Biomedical Research. She does, however, recommend using Twitter as a way to leverage unpaid work for paid work: "If you use it right, it could help you get your name out for stuff that you've written." Ultimately, Susan feels she was lucky to have been in the right place at the right time when she started her scicomm career: " I think living in Washington D.C. helped because there was so much work through the federal government. All the Health and Human Services (HHS) organizations have so many [science communication] needs. I worked for one company, but there were a ton of others that also did work for that segment of the government, so it was a really good environment to be looking for a job."

FIND AS MANY OPPORTUNITIES AS YOU CAN TO GET YOUR NAME ON THINGS.

Engaging with science and society at pgEd

By Johnny Kung | September 20, 2018

Participants in pgEd's Summer Institute for Teachers (July 2017).

Advances in genetic technologies and other biomedical innovations promise an improved understanding of how our bodies work, new treatments for debilitating diseases, and maybe even ways to alleviate health disparities. But as the science moves forward at a blistering pace, it is becoming ever more urgent for scientists to engage broadly with diverse communities, to raise awareness about where science is and where it is going, and to thoughtfully address the hopes and concerns of these communities. This kind of engagement and two-way dialogue is crucial if we as a society are to figure out the best way to shepherd technologies through thorny ethical issues, ensure that everyone will have the possibility of benefiting from the fruits of scientific research, and prevent technological advances from exacerbating existing inequalities and injustices.

The Personal Genetics Education Project (pgEd), where I currently work, strives to broaden the conversations about genetics and facilitate dialogue between scientists and communities. As the director of new initiatives at pgEd, I take on a variety of projects in the space of science education, communication, and policy. In this post, I hope to tell you a little more about how I ended up at pgEd, what I do there, and how you can set yourself on a path towards a similar position.

How pgEd broadens the conversation about genetics

pgEd, based at the Department of Genetics of Harvard Medical School, has a mission of raising awareness and starting conversations about both the benefits as well as the personal, social and ethical implications of genetics. In these conversations, pgEd strives to be inclusive of all voices, regardless of socioeconomic or educational background, cultural or religious affiliation, and ethnic or personal identity. We do this through a variety of activities, including creating educational materials and lesson plans that are made freely available online; running professional development (PD) workshops for teachers; organizing Congressional briefings in Washington DC; convening meetings of experts and leaders from academia, industry, community, education

Engaging with science and society at pgEd (CONT'D)

and government; advising writers and directors in Hollywood; and working directly with community organizations, libraries, youth groups, and faith institutions.

A pgEd congressional briefing in May 2018.

The conversations often move quickly into sensitive topics and uncomfortable places, from sticky ethical dilemmas to dark episodes in the history of eugenics and research misconduct. Past ethical breaches such as the Tuskegee syphilis experiment, the case of Henrietta Lacks, the Havasupai incident, and the sterilization of women in marginalized communities have created a legacy of distrust between these communities and the biomedical establishment. This, along with concerns about the use of DNA by law enforcement, continues to hamper efforts to engage these communities, including those by researchers hoping to increase community participation in new precision medicine research. A willingness to confront these tough issues is essential for building a rapport with these communities, which is in turn crucial if we want to make sure that everyone can be informed and empowered to make their own decisions about genetics, both as individual consumers of technologies and as societal participants in the political process.

My role at pgEd

I have always been very interested in the societal aspects of science, even while I was a bench scientist completing my graduate studies in molecular biology and epigenetics. So, I sought out a number of different opportunities to broaden my training beyond the biological sciences, as well as to acquire leadership and communication experience. These included taking extra coursework and attending seminars in bioethics, public health, science policy, and science and technology studies (STS). I also worked with a number of organizations in public engagement efforts, including giving public lectures, writing science articles for a lay readership, and working with middle and high school students. One of these organizations was pgEd. After obtaining my PhD and working in digital academic publishing for a year, I've since returned to pgEd as a full-time staff member for the past three years.

pgEd is a small team comprised of individuals from diverse backgrounds and disciplines, and everyone on staff takes on a variety of projects. With our focus on engaging the community and facilitating dialogue, a major part of our everyday work is to liaise with different organizations and individuals, to identify ways of collaborating, and to organize events that bring different voices together to talk about genetics. In addition to events that we put on, we are often invited to present our materials or speak about our experiences in a variety of other settings, including "conventional" academic venues such as scientific, educational or industry conferences, as well as schools, community events, churches or mosques. On occasion, we also get interviewed for print media, radio and TV.

Additionally, my current role entails a lot of researching and writing – following the latest developments in

Engaging with science and society at pgEd (CONT'D)

genetics research, their applications and regulatory policies; keeping tabs on the conversation about genetics in the media (both traditional and social); and synthesizing and translating all these into social media and blog posts, lesson plans, or information briefs for policymakers. The rapidly changing landscape of genetics and our consistent stream of events mean that there is never a dull day in the office. And in the run-up to a major event, such as a Congressional briefing or PD workshop, it is often "all hands on deck" to take care of the organizational logistics.

Setting yourself on the path to science policy and science communication

A career in science communication or policy requires broad interest in issues at the interface of science and society, and an ability to talk about science in a language that can be understood by those who are not experts in particular scientific fields. As scientists, many of us are used to being very focused on narrowly-defined research questions in our field of interest. We often communicate in very technical and jargon-filled language in academic writing and presentations. But for many people who don't work in these fields of research, what often concerns them the most about research is its implications for their lives, their health, their jobs and those of their families. Having a broad interest and awareness of issues outside of your field of research will allow you to better engage these diverse audiences and to identify issues or topics that are matters of concern for them.

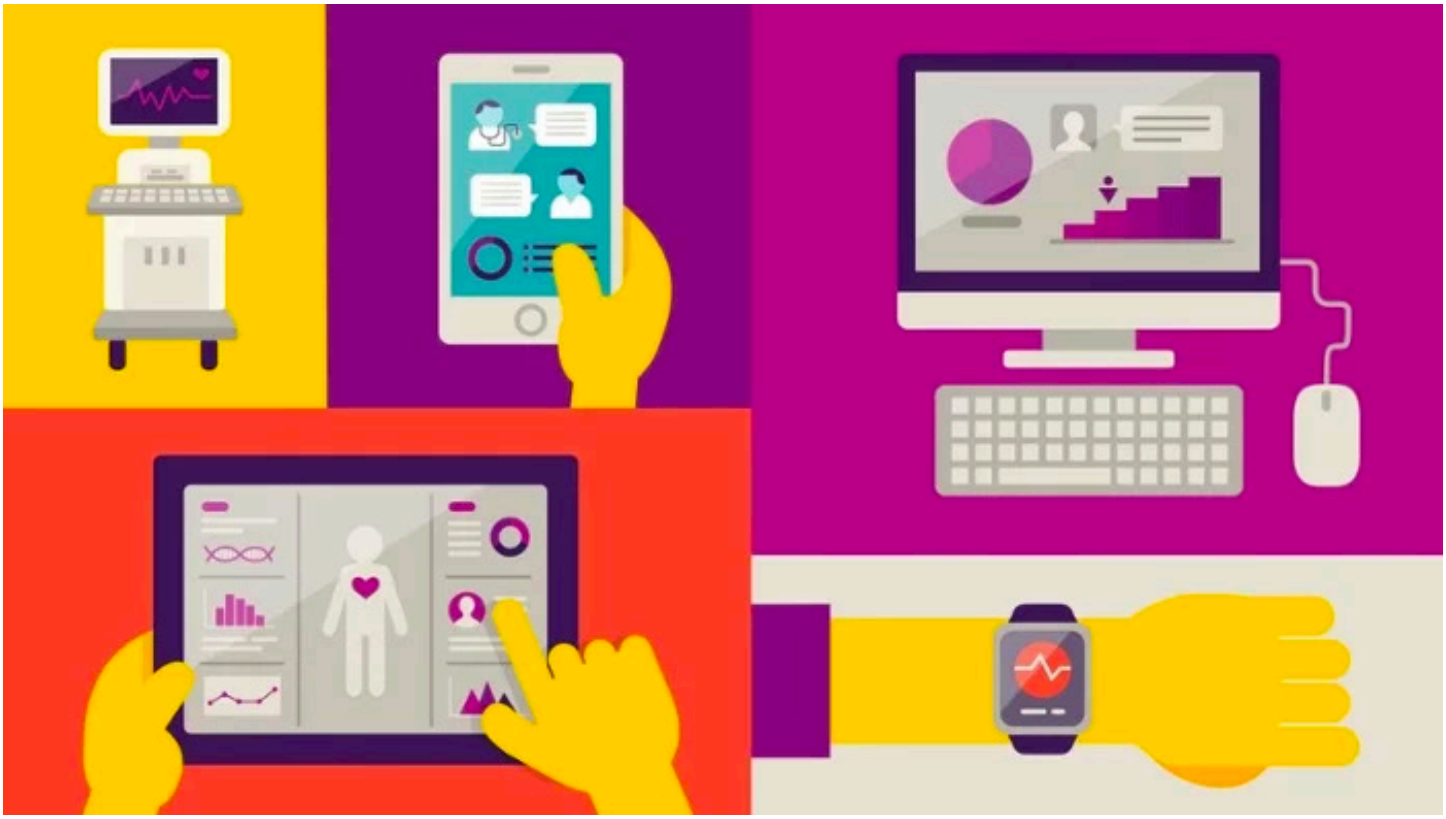
Researchers currently in academia who are interested in such careers should take advantage of their academic environment and attend seminars, symposia, or courses in social, health or policy-related topics, as time permits. Also seek out opportunities to communicate science to non-technical audiences. Many universities or cities have organizations (often volunteer-based) that put on public lectures, science cafés or science festivals, and getting experience in either giving or running these events will be important both in preparing you for future work in these areas, and in helping you decide whether you enjoy this kind of work. It is also beneficial to hone your non-technical writing skills by writing for science-outreach organizations or student publications, submitting op-eds to your local newspapers, or starting your own blog.

Even if you do not end up pursuing a career in science communication or policy, being able to communicate your work to a non-technical audience is an important skill for every scientist. After all, scientific research does not happen in a vacuum that is isolated from the rest of society or devoid of social context. This "general public" audience comprises the taxpayers who fund much of scientific research and who will be affected by the knowledge and applications generated from this research. At both a practical and ethical level, scientists arguably have a duty to engage the public on the implications of their work.

Healthcare consulting: A door to the business of life sciences

By Gairik Sachdeva | October 13, 2016

Healthcare consulting is a fast-paced field, requiring people who are willing to quickly learn, and apply their knowledge to a variety of problems. In this post, I'll share what I've learned as a healthcare consultant and give you an idea of what a career in this field involves, and why you might enjoy doing it. I'll also talk about the skills you'll need to do well as a healthcare consultant and what you could do to break into the field.



What is healthcare consulting?

Healthcare consultants advise pharmaceutical companies, biotech start-ups, health insurance companies, and governments on the most effective and efficient ways of delivering healthcare. Clients typically engage consultants as short-term experts to work on "cases". Cases present specific operational or commercial challenges or questions that clients face imminently. Consulting firms deploy case teams, usually with 3-6 consultants, who work on analyzing the situation that presented the challenge at hand and help resolve it through well-informed recommendations.

Healthcare consulting firms that specialize in business strategy tend to be mostly engaged by pharma and biotech clients. In this realm, there are a few different kinds of challenges that consultants get called upon to tackle, depending on the part of the company involved:

Healthcare consulting: A door to the business of life sciences (CONT'D)

1. Research & Development (R&D) teams at pharma companies carry out preclinical and clinical research to discover and test the best new therapeutics. Consultants often work with such teams to help make decisions about R&D investments in either new internal efforts, or through acquisitions of or collaborations with other companies.

2. Medical Affairs groups work on building awareness among physicians and scientists about clinical research, drugs, the diseases they can treat, and diagnostic advancements. Consultants can help these teams develop communication strategies, or understand, and publish on the health and economic benefits of novel drugs.

3. Commercial Affairs teams make up a large and diverse group of professionals running the marketing, commercialization, collaborative, and financial functions associated with the business. Commercial teams routinely work with consulting firms on projects such as marketing drugs to physicians and patients, shaping discussions with insurance companies about the pricing and coverage of drugs, and developing internal operational capabilities.

In just two years as a healthcare consultant, I have worked on most of these kinds of projects. Almost all of my projects, have involved enriching conversations with R&D, Medical Affairs, and Commercial teams, reflecting the need for all parts of a company to collaborate whenever it faces an important challenge. The types of projects mentioned above are just examples, and healthcare consulting firms can be involved in many similar activities depending on the expertise of the senior leadership and members of their consulting staff.

Who would enjoy healthcare consulting?

One of the most rewarding parts of the job is being confronted with challenges that are crucial for the success of a drug's clinical and commercial future, and yet are incredibly difficult to find solutions to.

There are many reasons why client situations might be especially challenging. For instance, the client might need to get a large amount of market research done to inform a go/no-go decision in a very short amount of time. Such a decision determines whether the client invests substantial monetary and human resources towards the development of a new therapy based on its market need and anticipated commercial success. Or the client might need help with the intricate task of designing a strategic vision for a portfolio of candidate drugs. A decision like that would allow the client to prioritize investments over the next 3, 5, or 10 years. Complicating these challenges is the fact that they occur in the context of significant clinical uncertainties and a rapidly evolving healthcare space.

The consultants who enjoy their jobs most, get pleasure from taking up such complex challenges, quickly breaking them up into smaller achievable tasks, and then executing on them in a timely fashion while allowing for creative solutions to emerge. They enjoy the fact that each new challenge will require knowledge of new topics and that they will switch to other newer topics every 4-8 weeks. These topics are typically cutting edge; a consultant might outline the impacts of combining targeted molecular therapies for cancer with chemotherapies, or developing innovative mobile phone applications and services that help diabetic patients manage doses and timings of their drug treatments.

The process of rising to such challenges involves using knowledge from previous consulting experiences, educational training, and conferences, and synthesizing this knowledge into a coherent narrative that gives

Healthcare consulting: A door to the business of life sciences (CONT'D)

the client a defined path forward. Communication is key as ideas must be relayed quickly both internally and externally to clients and experts. Hence, active honing of communication skills is a must to be successful in this field. Personally, I have greatly benefited from and appreciated the training I've received in concisely and accurately communicating ideas in a content-rich, easy-to-understand set of PowerPoint slides.

What are some of the more challenging parts of the job?

With fast turnover of projects, pressure to maintain consistently high levels of performance, and occasionally being faced with "shifting goal posts" as a part of a case, consulting can sometimes be challenging.

The fast paced nature of projects often means working long hours both at home and at the office. Consulting firms are increasingly aware of the toll that long working hours and the unpredictability of schedules can take on employee morale and productivity, and many have mechanisms in place to prevent the burden from getting overwhelming. These mechanisms include efforts like flexible staffing on case teams, where case managers are encouraged to use the wider firm's resources when their teams are facing a crunch, and using lessons from previous cases to better staff future teams.

As with any highly collaborative work place, challenges can arise due to conflicting work styles, team situations, and personalities. Teams striving to achieve a lot of great output in a short amount of time can sometimes become cauldrons on the verge of boiling. On other occasions, clients can be excessively demanding. For instance, a client may offer a lot of pointed feedback or abruptly change needs and expectations. Such situations can get stressful and to help manage that, most consulting firms coach and counsel employees on the different personality and work styles (e.g., Myers-Briggs). Staff are trained on how to work best with diverse teams, to leverage the preferences of different personality types, and to devise strategies to be prepared for addressing unexpected situations.

At the end of the day, the consultants who enjoy their jobs most are those who understand that these challenges are an inevitable part of the profession, and that they can be ameliorated by thoughtful planning and engagement, leaving mental energy to enjoy the more rewarding and educational parts of the job.

Is consulting meant for PhDs?

Healthcare consultants are usually trained in the life sciences, in business, in healthcare economics, or in some combination of these fields. I got my PhD a couple of years ago in Bioengineering, and one of the things that pleasantly surprised me in my first few months as a healthcare consultant was how much my scientific background, training in reviewing literature, and critical analyses skills were applicable to my cases. I can directly use my understanding of the molecular behaviors of chemicals and proteins to learn how a particular drug or medical device works. This understanding sits right at the core of the suite of benefits a given therapeutic approach brings to patients, doctors, and insurance providers, and is crucial to how our clients' products will end up performing in the market.

Hence, as a PhD, an MD, or someone trained in any aspect of research in biology or medicine you will bring an essential set of tools to a consulting team. Your case team will rely on you to bridge the gap between the science and the commercial applications of a particular therapy. With your scientific knowledge behind you, you'll have the opportunity to learn the business side of consulting cases, while feeling like you are pulling your weight with

Healthcare consulting: A door to the business of life sciences (CONT'D)

your scientific expertise.

Do I have to stick with consulting in the long-term?

A few years as a healthcare consultant can prepare you for a successful career in several different fields. While some people continue to enjoy the challenges of healthcare consulting for decades, others go on to work with commercial teams at pharmaceutical companies, nonprofit or global health organizations, investment and equity research firms, biotech start-ups, venture capital firms, and more.

Essentially any role in the broad healthcare space that can benefit from the blend of business and scientific understanding of successful therapeutics can be a great fit for former healthcare consultants. I have even seen consultants go back to research and bench science, with a newfound appreciation for how technologies get developed and commercialized after they leave the academic lab.

How to get your foot in the door

When I was first considering preparing for and transitioning to a career in healthcare consulting, I found that talking to alumni, friends, and friends of friends who had worked in the field was one of the best ways of both learning about the nature of the job and the ways to prepare for it. Besides those conversations, reading online healthcare industry publications like FiercePharma, FierceBiotech, and BioCentury can be an engaging way to learn about the trends and workings of the healthcare industry. Finally, on-campus resources like career offices, classes at business schools, and consulting clubs are especially helpful since they both provide up-to-date information about the industry, recruiting processes, and can connect you to a community of colleagues who are pursuing similar jobs and non-academic careers.

Now, more than ever, there are many non-traditional career paths available to MDs and PhDs, and an increasing recognition of the value graduates bring to these roles. Healthcare consulting is a demanding but attractive choice for anyone who wants a fulfilling career solving hard problems or who needs a stepping-stone to many other opportunities.

A career in grants: How to become a grant professional

By Jo Miller | June 22, 2017

The path to a career as a Grant Professional has been a long and winding path for many in the field. The vast majority of grant professionals didn't plan on becoming grant writers. When we asked others about how they became grant professionals, mid- to late-career grant professionals have similar stories about a time when their passion for an organization or a program and a funding opportunity coincided, and they stepped up to apply for a grant which lead to their new career path. A part of the career path story for most established grant professionals is learning to succeed in grants through trial and error, through winning and losing funding, and by finding our individual niches within the field of grants.

What is a grant professional?

In the past 5-10 years, the Grants Profession has become just that, a profession. A grant professional works for or with an organization to evaluate the organization's grant readiness, identify grant opportunities, secure grant awards, and manage grant projects and funds. You will often hear the term 'grant writer', but make no mistake, researching, winning, and effectively managing grants involves much more than writing.

In fact, many grant applications and grant makers have moved away from long written proposal narratives. Now they require grant seekers to use online applications with significant character limits for the written portion of the grant application. They have increased their demand for stronger budgets with clear budget narratives, logic models, established partnerships and collaborations, and commitments to and proof of compliance with the grantor's requirements as well as state and federal regulations.

A grant professional's job duties can range from coordinating the grant application and submitting it, to evaluating the capacity of an organization to receive and manage funds. Grant professionals identify grant opportunities with the highest likelihood of funding and develop a strategy and projections around that likelihood. We provide expertise on the processes needed to successfully implement, manage and close-out a grant. Grant professionals also build relationships with foundations and government grantmakers. We keep up-to-date on the changing guidelines and regulations impacting grant management, we track grant opportunity deadlines, and we ensure that grant reports are submitted and project evaluations are completed.

To enter and advance the profession, you can find professional development, certification, degrees, foundations, coaching and even Twitter Chats dedicated to the Grant Profession.

Demand for grant professionals

Why have we seen a sharp rise in professional development targeted to the grants profession? The number of organizations, both public and private, that qualify for grants, the amount of grant funds available and the increasing regulatory process for grants has fostered the demand for experts in the field of grants. It is no surprise that the U.S. Bureau of Labor and Statistics shows that employment of grant writers is expected to grow by 16% between 2010 and 2020.

A career in grants: How to become a grant professional (CONT'D)

How did you get started in the grant profession?

I asked Deborah Cook, Ph.D., GPC, previously a college biology professor, how she became a grant professional. Dr. Cook served as a principal investigator for several research grants. One of the benefits of being a principal investigator is that you are asked to review grant proposals from others. Dr. Cook was asked to serve on review panels and to review education materials for publishers. When the community orchestra needed a grant writer, Deb volunteered. Through these experiences, she realized her niche as a grant consultant to faculty writing research grants, especially in the sciences and by extension to scientifically oriented nonprofits.

Like Deb, I worked for an organization in a position that required some involvement in the grants process and managing programs that were grant funded. I worked for a health department and then for the regulatory services department as our healthy homes program was moved from one department to another within city government. Throughout these moves and program changes, I learned to write grants for health, housing, economic development, education, workforce development, and more; our work touched on many different issues, and our program didn't stay in one place within the city infrastructure. My career path changed when I was asked if I would consider consulting for a particular grant by another state. With the blessing of my employer, I took on my first consulting job, and I began to realize I too had a niche. As a result, I started my own grant consulting firm, a Twitter Chat, and then our grant training and mentoring.

How do I become a grant professional?

Employment opportunities for those with expertise in grant writing, grant management, grant administration, and grant evaluation are available through not-for-profits, universities, local and national government offices, schools, healthcare facilities and with private businesses.

How do you get the expertise needed to enter the grants profession? The four steps listed below can give you the resources and path to help you enter and to have a successful and meaningful career in the grants profession:

1. Build on your existing skills & passion

Skills such as research, collaboration across multiple disciplines, writing, project management, and program evaluation are highly transferable. Use your experience and your passion(s) to guide you in building a grant career.
Do you have a passion for the arts? Do you find satisfaction in helping your local food shelf raise money? Do you have experience with research grants? Are you interested in sustainable community development? Volunteer as a grant writer and/or grant reviewer with a local nonprofit that aligns with your passion to get grant development experience and to build upon your existing skills.

2. Find your niche

Identify and develop an area of expertise. Whether you're seeking a full-time job or want to be an independent grant consultant, building your area of expertise will help you find work and target your professional development.

A career in grants: How to become a grant professional (CONT'D)

Do you want to work in a particular area, e.g. education, poverty, environment, early childhood development, or community development? Do you want to focus on a part of the grant development and management process or the whole process, including grant readiness, funding opportunity research, application writing and development, project implementation, program evaluation and grant management.

Your niche will change over time. Going into the grants profession with a concept of your ideal client or job will save you and the organization(s) you serve time and resources.

3. Get a mentor, find your people

Find someone who is working or has worked as a Grant Professional to mentor and coach you. There are many grant consultants who offer grant training, mentoring and coaching services, including Smartegrants, to help those entering the Grants Profession. Whether you're transitioning from a previous career or you're starting your first career, a mentor in the Grants Profession can help you focus your career goals, identify your niche, and answer questions when you're negotiating a new job or a new contract. Connect with other grant professionals on LinkedIn and Twitter. Join the Grant Professionals Association (GPA) local GPA Chapters, special interest groups and the National Grants Management Association (NGMA).

4. Develop a professional development strategy

Build your own Professional Development Strategy to increase your competencies and skills in the grants profession. Your professional development strategy builds on the steps listed above and formalizes your development. You may consider earning a degree in Grant Writing, Management and Evaluation and/or earning the GPC credential from the Grant Professional Certification Institute (GPCI). GPCI evaluates a candidate's expertise (a minimum of 3 years experience) and experience through the candidate application process, the candidate's ability to write a grant application through a written exam, and the candidate's knowledge of the 8 core competencies through a multiple choice exam.

The bottom line

The Grants Profession is in a rapid growth phase. As a result, there are more opportunities to connect to other grant professionals and to build your skills and competencies. Becoming a grant professional is rewarding and challenging!

Walking beside academia and giving it a high five

By Tyler Ford | July 2, 2015

Just over a month ago I finished up my PhD in Biological and Biomedical Sciences at Harvard University and entered a new role here at Addgene as an Outreach Scientist. I used to spend my days (and often my nights :D) engineering E. coli to produce biofuels in Pamela Silver's Lab (plasmid page here). Now I spend much less time wrangling bacteria and instead help Addgene fulfill its mission of helping scientists share information and, of course, plasmids. My primary duties are to manage this very blog (you'll have to let me know how I'm doing a few months down the line!) and to visit scientists in person to figure out ways we can make Addgene better and make scientists' lives easier.

Why transition to Addgene?

So why did I join Addgene? Was I jaded by my time in academia? Did I run screaming from the lab like the cartoon on the right?!? I would love to tell such a dramatic story, but it wouldn't be my story. I love academics. If I didn't, it would have been unwise of me to join Addgene. This is particularly true in my position as an Outreach Scientist where I spend a large amount of my time meeting with and talking to graduate students, postdocs, and PIs. I won't pretend that that there aren't problems with the academic enterprise or that there weren't some pretty hefty bumps during my graduate training. I particularly think that too many young scientists are led to believe that they can all end up in academic positions (I've even blogged about this here and here); however, simply put, I moved into this position because I want to help make the research enterprise work better and because I really like talking to people about and communicating science.

The path to science communication

This may come as somewhat of surprise to many of my high school friends. In my teenage years I was super shy - there was even a time when I was too nervous to ask store clerks for help at the mall. In undergrad I was forced to open up a little after I dropped myself into Boston University with none of my old friends to fall back on. While doing and presenting undergraduate research at BU, I realized that I'm energized by talking to people about science and that I love explaining things to people. When I started my graduate work at Harvard, I recognized that I would ultimately want to go into science communication but thought that I would be best poised to share the stories and difficulties behind great discoveries by tackling a research project and getting a PhD myself. To continue to foster my science communication skills, I took on TA positions, tutored fifth graders, made a blog (it needs to be updated) and worked as editor-in-chief for the Science in the News Blog, a blog made by the Harvard graduate student group, Science in the News. While research experience is key to my current position, I think it's largely my work developing myself as a science communicator that got me here!

Walking beside academia and giving it a high five (CONT'D)

Thus far being an Outreach Scientist at Addgene has been awesome. The process of writing, editing, and publishing blog posts runs its course more quickly than writing scientific manuscripts and, as one of my supervisors warned me, the swift gratification of publishing posts can be addicting. Even more satisfying, because Addgene is a non-profit, we can focus more on generating blog content that scientists will find useful and interesting than that will simply get people to order plasmids. The need to keep content coming also keeps me on top of a variety of fields thereby broadening my knowledge. In addition, this position allows me to do another thing I've always thoroughly enjoyed: travel. I'm actually finishing up this post on a plane back to Boston from Kentucky where I spent a couple of days talking to researchers about their work, picking up plasmid deposits, and trying to learn ways Addgene can improve in its mission to make accelerate science.

I'm hoping my story demonstrates that transitioning from academia doesn't have to mean abandoning it or running away screaming, but instead can involve walking alongside it and giving it a high five. While screaming can be therapeutic and I've certainly done my fair share of venting, I'm glad I did a PhD and even more glad that I thought about careers outside of academia during my graduate training. PhDs have many roles to play inside, on the outskirts, and entirely outside of academia. These roles can include positions, like mine, that help support academia but the skills researchers gain doing PhDs (i.e. technical writing, teaching, presenting, analytical thinking, time management, information distillation, etc) are transferable to many different fields. If you start thinking about preparing yourself for a career while still in graduate school, you'll be well suited to follow your passion and land a position you'll be happy in once you've finally acquired that PhD.

Advice for moving into sales after your science postdoc

By Seán Mac Fhearraig | August 21, 2014

I sold out, well in part that's what leaving academia feels like for a lot of researchers. For many years I struggled with the questions of "Will I leave academia?" and "What type of science careers would would make a good fit for me?" Whatever would I do next and what options lie ahead of me? Like a considerable number of researchers, I had high hopes of securing tenure in a British or Irish University where I would continue on with my academic dream of studying cell division. However, after 6 years in the business of western blots and cloning, I decided to pack it in. I had just started month 8 of my 3 year Post-Doctoral contract at the University of Cambridge and knew it was time to leave. I really enjoyed my time in the lab, my colleagues and what I was researching, but I decided I needed a new challenge.

Addgene's Outreach and Business Teams consist of a mix of scientists, lawyers, and business people all woring together.

Looking for sales and marketing jobs

Like most choices we make, my job choices were mostly by chance. Luckily, around the time I decided to look for work outside of academia, a job as a 'Cancer Marketing Coordinator' came up at Abcam. Unlike other job descriptions for marketing positions posted on recruitment websites, this job specifically looked for a researcher with 3 years+ of cancer research experience, a PhD or a Master's degree and some marketing experience, with little emphasis placed on the marketing or business background of the applicant. However, although this position did look for an academic candidate, I knew they would look for a candidate with extra experience or enough marketing interest that would be able to apply themselves immediately to the position.

In case you are interested yourself, sales and marketing positions like these are widely available, especially for life science researchers. Many biotechnology companies are looking for PhD or Master's level scientists who have knowledge of their product portfolio. After all, you have been their target market for many years and have purchased their products, so you have some of the best ideas on how to sell these products to other scientists.

Altering my CV

To become an attractive candidate I knew I had to push not only my academic background but also my business acumen and sales experience. Most scientists think that they are unable to tick these final two boxes, but I knew there would be a way around this. First off I tore up my "Scientific CV" and wrote a more business friendly CV that would focus on my achievements, capabilities, courses and office skills. I removed my techniques and protocols, courses taken during my PhD and Undergraduate sections and brought in more focus on the list of conferences I presented at and placed them under headlines entitled "Presentation Experience", "Career Achievements", and "Academic Achievements". Leaning my CV more towards me as a product and not me as a scientist. Second, I updated my LinkedIn profile, matched it with my CV and added more business-like elements. At this point you may be asking yourself, "Why would you switch the focus of your CV from science-focused to business-focused?" The reason is that I knew that the mind-set of the employer was not such that he/she would

Advice for moving into sales after your science postdoc (CONT'D)

be looking at where I had published, who I had published with and whether I would be able to carry out a yeast-2-hybrid library screen; instead I thought they would focus on "Has this person been consistent throughout their career?", "Have they sought out opportunities to expand their skill sets?", "Have they succeeded in what they have done?" and "Would their academic experience compliment this sales and marketing role?".

Studying for interviews

Studying for interviews is really important. For my Postdoc position, I tried to read at least 50 papers on the topic before I went for the interview. So reading for my current sales position interview was just as important. The problem was I knew I had a knowledge gap. I had no previous business, marketing or sales training and knew I had to start somewhere. I knew if I started with the Harvard Business Review or some Chartered Institute of Marketing reviews, I would have struggled. Furthermore I would not have covered as much of the basics of sales and marketing and reading some of these articles would have stressed me out more than necessary for my interview. The simplest place I could think of to start was "Marketing for Dummies". The fastest way to learn something about marketing would be to start reading a broad simple overview, learn some jargon and key phrases and understand enough to relate it to the position I was applying for. After all I was only going to be interviewed for 1 hour so having a broad enough insight was going to help me push both my scientific and marketing knowledge.

For most PhDs looking at careers outside of academia, sales and marketing can be great places to start. Depending on what type of career you would like to build, sales and marketing gives you a great introduction to the financial world. It teaches you about selling products which is an important part of the business and allows you to work with and alongside the customer. From there a move with either promotions or further education may allow you to transition into various realms of business.

Science careers: Unruly interests feed many paths

By Pamela J. Hines | September 26, 2017

Although we only walk one path at a time, the variety of paths in life is mind-boggling. Unlike a mountain – with many routes up and only one destination – a career in the sciences is more like an intergalactic network. Which planet will you visit? Where will you stop for refreshment along the way? What ecosystem makes your heart sing with delight?

From developmental biology to developing a career

Developmental biology caught me early on: a simple egg is packed with information. I am fascinated with how developmental programs unfold, absorbing the stochasticity of molecular interactions and embedding individual diversity to get from gamete to a visibly complex - and unique - adult. My initial research directions followed that avenue with projects studying developmentally programmed regulation of DNA replication and gene transcription during vertebrate embryogenesis.

My interests, though, have proven unruly. Instead of settling down into a singular focus on molecular pathways, I found myself curious about other routes – In terms of both types and topics of work. A younger interest in being a writer kept chirping up. The evolutionary perspective brought by studies of comparative anatomy showed me that some of the most fascinating biology is found in weird and rare organisms so I found it hard to stick to vertebrates alone. And a longstanding inclination to be a teacher was looking for an outlet.

I started asking people: why do you do what you do? How do you like it? How did you get there? Many of those people I met through AWIS (Association for Women in Science); others were visiting seminar speakers. My eye was caught by a couple of unusual job openings, although they seemed too far afield at first and I let them pass by. But I didn't forget: what would it be like? Then I spotted an opening for being an editor at Science magazine. That one I just could not resist applying for. Not that I knew anything about being an editor - that I learned on the job.

The day-to-day work of an editor

In my role as an editor at Science, my various interests come together as useful and productive, forming a different constellation of interests and skills than what fits for applied research. I focus in general terms on a couple of very broad topic domains, but each day brings in new and surprisingly diverse manuscripts. I work with people, nurturing networks, as much as with technical knowledge. I leverage a breadth of knowledge to put diverse aspects of bioscience into context, while at the same time working through the details of experimental design and data with authors and referees. And I am constantly teaching – often explaining a technical piece of research to others outside that specialty, who may be other scientists, or science journalists, or policy makers.

The term editor covers a wide variety of careers and jobs. At Science, which is published by the American Association for the Advancement of Science (AAAS), we have all sorts of different editors. Do you like science journalism? Take a look at our news editors. A fondness for visualization of science? Look at our graphics and design editors. How about condensing a week's worth of the world's scientific discoveries into an entertaining podcast? Look at our multimedia producer and online editor. And, the copyeditors deal with things like word choice, punctuation, and stylistic consistency. If you've ever doubted the importance of copy editors, the New

Science careers: Unruly interests feed many paths (CONT'D)

Yorker's "Comma Queen" shows how punctuation can be wildly funny as well as financially critical.

Those who work on the publishing side of science have professional meetings, societies, networks just as do research scientists. There we meet others in the scientific publishing world and debate issues about how to improve the scientific publishing process. There is a rich and active community of science communication professionals who are thinking about, for example, how to use new technologies to reach the right audiences and how open access affects financial models in information publication. Take a look at the blog 'Scholarly Kitchen' for a glimpse into the world of scholarly publishing. And see for example the International Congress on Peer Review and Scientific Publication, where diverse approaches to peer review were discussed.

Science communication opportunities

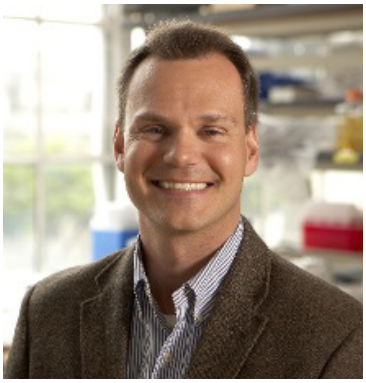
If you are interested in the science communications world, you might consider an internship or a short program to build skills and connections. AAAS offers a summer program that gives graduate students an opportunity to work in radio, print journalism, and other media outlets (AAAS Mass Media Science & Engineering Fellows Program). Science journalism programs at various universities range from week-long workshops to more in-depth master's degree studies.

No matter what planet you are on at the moment, we now know there are a lot more planets to choose from. Put your skills and interests into your backpack, and step out there into the galaxy.

TL;DR: Many roads need scientists open for adventure.

Advice for starting a biotech company from a grad student turned entrepreneur

By Margo R. Monroe | July 10, 2014



As a biomedical engineer and scientist, I like to envision that my research will have a direct impact on healthcare and the community. As a result, I have occasionally pondered translating my research into a startup company. However, like many like-minded people, I quickly realize that a company requires more than just good data to become a product.

I spoke with Dr. Mike Koeris, co-founder and former VP of Business Development & Operations of Sample6, for advice on how to take an idea developed during graduate school and turn it into a biotech company.

Transitioning an idea from academia to a startup

Mike Koeris and fellow co-founders Tim Lu and others first came up with the idea that would evolve into Sample6 as graduate students in Dr. Jim Collin's Lab in 2009. From 2009 to today, Sample6 has changed focus and names, swapped leadership, and grown.

What is Sample6? Sample6 is an enrichment-free bacterial pathogen detection system that uses synthetic biology to target and light-up bacteria unwanted in food, healthcare settings, etc.

What project in the Collins lab inspired Sample6? The initial work focused on using bacteriophages as bacterial therapeutics. This idea was incorporated into Novophage Therapeutics, Inc. in March 2009 and tested in the "market" by competing in business plan competitions. After much learning, the focus of the application was changed, but Sample6 still leverages the core engineering and scientific concepts to engineer bacteriophages and use those to detect unwanted bacteria.

How did graduate school help prepare you for the roles and skills necessary to be a succesful entrepreneur? As a co-founder of a biotech startup, Mike explained, his career transitioned away from the bench and became all about finding the best product-market fit for this set of technologies, effectively communicating the advantages embodied, and driving the enterprise value of Sample6. "Concisely and effectively presenting the value tailored to each and every audience uniquely (not a focus in graduate school usually) is one of the key skills required to achieve success in this business. A good presentation can help win a business plan competition and advance investors to the next stage of diligence." In business competitions everything is conceptual, and the team that packages its pitch the best, wins. He explained that entrepreneurs must clearly communicate their idea at various levels of complexity and abstraction and convince people with diverse backgrounds how amazing their idea is. While communication styles in academia and industry vary drastically, he reassures that one can learn it by reading a broad variety of materials and constantly practicing. "The expenditure of effort in preparation and practice is directly related to success presenting."

A journey from graduate student to Founder, CEO, COO and VP. Mike was fortunate enough to be able to spend his last 6 months in graduate school focusing on concept development and participating in business competitions. When the team was unable to secure enough money to sustain a startup, he went to work for Flagship Ventures – a local Cambridge biotech venture capital firm with deep ties into the local academic community. However, Mike still could not remove himself from the idea of starting a company around engineered bacteriophages. He decided to quit his "safety net" at the VC firm and devoted 100% of his energy

Advice for starting a biotech company from a grad student turned entrepreneur (CONT'D)

and effort into making the startup self-sustainable. Within a year of this decision, Mike and his co-founders raised $6 million. The biggest challenge during this time was learning to communicate effectively to non-scientific audiences. "There are 100 ways to tell a story - convince your audience you are doing amazing things." As Sample6 raised more money, the team grew, and Mike stepped down from his CEO position and became first COO, then moved on to become VP of Business Development & Operations.

Starting a biotech company

When and how does a startup become "successful"? First, Mike explained that the data must be reproducible by someone else. Second, "an entrepreneur must be OK with the constant fear of failure at all stages in the startup". To gain insight into "the random-walk" of a budding startup, I asked Mike to outline 3 pieces that are essential to the biotech startup puzzle:

1. Nucleation of the team. The team is key, and the initial team is the cornerstone of it all. Without a good nucleus, the company won't go anywhere. The team should initially consist of 2-3 individuals that are aligned in vision and outcomes. The team must work well together, have complementary skill sets, and "talk a good game." Mike recommends that the team should initially include a visionary, a science-minded individual, and a specialist. Notably, the team must have an upfront conversation about its goals and vision for the company; this will help avoid future complications and potential conflicts that waste money and time. Most importantly, "the company does not become real until someone takes the risk full-time and abandons all safety nets."

2. Raising seed money. "Before seeking funding, ask yourself if you really want to do this." Biotech startups are only successful if they are 100X better than current technology and get customers to change behavior. When you are ready to commit to the company, the internet, crowd funding, federal funding, foundations, and investors are examples of various sources of funding. Always ask for money. Moreover, many universities throw out old equipment that still works. "We use functional spectrometers from the early 1990s that were free and free to repair." If the team works well, the idea is solid, and "the pitch is packaged to perfection", seed money will hopefully be raised and the company may begin to prove the technology. This transition takes around 1 – 2 years.

3. The product is the measure of success. Technology is proven in (A) Productize, (B) Roll out to market, and (C) Break even cycles. Work hard. Work fast. Be flexible. Be quick at failing and succeeding.

Take home message

Starting a company requires dedication, passion, and around-the-clock work. Mike wraps it up: "The idea is the easy part! There is no excuse for a startup to fail - it all depends on you and the amount of work you put into it."

Have any other helpful tips to help transition a project from academia to a biotech startup company? Would you like to contribute advice on how to effectively raise money and/or validate an idea or product? Please let us know by reaching out on the Addgene blog! Check out the further reading on the next page for more great information about starting a biotech company.

Advice for starting a biotech company from a grad student turned entrepreneur (CONT'D)

Further Reading

The Founder's Dilemma by Noam Wasserman

The Billion Dollar Molecule: One Company's Quest for the Perfect Drug by Barry Werth

Ten Tips for Raising Startup Capital in Biotech - Posted on Forbes.com, contributed by Bruce Booth

How to Find a Job in Biotech and Resume/CV tips - LabSpaces Blog

Find a Buisness Plan Competition

Good Relations - PR for the Biotech Business - Posted on Nature.com, contributed by Julia Phillips and Fiona Beckman

Check out our podcast interview with Dr. Mike Koeris for updates on his career development!

Acknowledgements

Thank you to Dr. Mike Koeris (Co-founder and formerly VP Operations of Sample6) for taking the time to speak with us about the biotech startup process and work environment!

Advice for starting a biotech company from a grad student turned entrepreneur (CONT'D)

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Advice for scientists starting a lab

By Margo R. Monroe | April 29, 2014

In the blink of an eye, the long days in the lab as a graduate student and postdoc come to an end and your next professional adventure begins. While many career pathways exist for scientists and engineers, a few brave scientists will choose to start their own academic research laboratory.

How does one even go about starting a lab? Obviously, funding and support are crucial parameters, and familiarity with equipment always helps. But how does one build a strong collaborative research team motivated by similar visions and goals? Here we discuss these topics with three PIs who have successfully built their own labs.

How did you build your lab team and foster an effective working environment?

Tom Ellis was offered a start-up package that included a postdoc and a PhD student in his first year. "It was very important to me to be with them in the lab when they started, so that we could discuss our projects and ideas every day and decide on the best way to structure roles and responsibilities as we grew." Initially, he spent the majority of his time in the lab. As time went on and he was spending more time in his office, he gradually incorporated regular group meetings, journal clubs, and focused sub-group meetings to discuss day-to-day progress, ideas, and ways to improve the lab. "An effective working environment for research is totally dependent on communication amongst the team so getting everyone talking to each other cannot be undervalued."

Connie Cepko points out the limited choices in hiring graduate students and postdocs when starting out. She advises "do not hurry to staff up the lab and to take things slowly! It is more important to carefully select first hires who are well-suited, productive, and fit well with your goals. These first hires will set the tone and atmosphere that future hires will look up to." She also recommends to seek out advice from seasoned PIs who can offer support. "It is an exciting and emotional time!"

George Church tries to recruit people who are nice as top criterion and offers advice to not rush when growing your lab. "One bad choice can be counter-productive." He also emphasizes the point to "encourage sharing - in part by having projects ambitious enough that everyone wants to recruit rather than repel and hoard."

If you've already secured a faculty position, start studying up before you begin the hiring process. Read Genevive Bjorn's "Ready, Set, Hire" on Nature Jobs for some quick advice and resources for hiring research staff. And for a more indepth resource for starting your academic lab, download Science Careers' "Running Your Lab" booklet.

What has been the most suprising thing about becoming a PI?

Tom Ellis has a one word answer: "Email. Nothing prepared me for what a PI without a personal assistant has to deal with. My inbox currently stands at about 65,000 messages and dealing with email can be half of my day sometimes." He points out that the copious amounts of email are probably because a PI does 7 or 8 jobs: "a teacher, departmental administrator, lab and safety manager, researcher, adviser, conference planner, and writer."

Advice for scientists starting a lab (CONT'D)

Connie Cepko was surprised by the variety of skill sets she needed to acquire as a professor. "Being a PI is more than just experiments and grant writing. You have to enjoy the mentoring role." She points out that new PIs may not recognize that every graduate student or postdoc may require different types of mentoring. Some mentees prefer lots of advice and micromanagement, while others are more productive in a hands-off environment. "Treating people fairly does not mean equally."

George Church was surprised by "how much better it is once it gets fully up to speed." He also comments that it is also surprising " how easily people talk themselves out of great projects as 'impossible' or useless."

Do you run your lab differently or the same as your adviser?

Tom Ellis merges the influence from his two PhD advisers who were "chalk-and-cheese". While one was an established Professor who was always "off flying his plane to exotic places while occasionally emailing us his worldly advice", the other was "a young PI who was in the lab with us every day and in the pub with us in the evening, wanting to know our latest results as soon as the gels ran." Dr. Ellis tries to lead his team as a scientists and a friend.

George Church runs his lab fairly similarly to his advisor Wally Gilbert: "Very interdisciplinary, with emphasis on genetic engineering, sequencing, and translation of results to companies."

Take home message

Starting a lab can be a challenging process. Each PI emphasizes the importance of slowly building up your lab and selectively picking the first couple of hires to build a strong, collaborative team. And take advantage of the many resources available from your institution, your department, and online. The Howard Hughes Medical Institute (HHMI) offers some great resources for Early Career Scientists, including their "Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty" downloadable book. Skip to Chapter 3 for tips on how to develop your role as a lab leader, and then on to Chapter 4 for advice on staffing your lab.

Further Reading

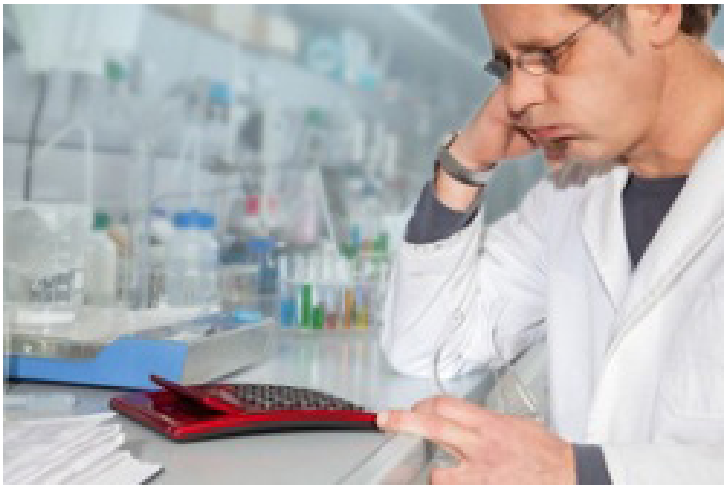
- EMBO Lab Leadership Courses
- HHMI Resources for Early Career Scientists
- Science Careers: Running Your Lab (pdf)
- Advice for Choosing a Research Project
- 9 Tips to Achieve Success in Academia

Acknowledgements

Thank you to Dr. Tom Ellis (Imperial College London), Dr. Connie Cepko (Harvard Medical School) , and Dr. George Church (Harvard Medical School) for taking the time to speak with us about adding new scientists to their labs.

How to negotiate a successful lab start up budget

By Damien Wilpitz | September 1, 2015



"How much do you need [for your lab start up]?" A hiring chair or dean will often ask a faculty candidate. Sweaty palms. Heart racing. Cotton mouth. The candidate may find it difficult to answer and these are all symptoms of a negotiation, especially when money is involved. However, it doesn't have to be this way, if you know what you need.

Most often, early career scientists aren't trained to have these types of negotiations. They usually turn into "win-lose" negotiations. This leads to poor outcomes; not enough funds to get started, wasting funds on unnecessary materials, or even a loss of the offer all together. The problem is that the discussions usually focus on the numbers, rather than the necessary resources. This is why at Experimental Designs Consulting (EDC), we instead have our clients focus on their experimental needs and consider a budget as a resource checklist.

A budget is an account of the material resources needed to accomplish your science, and can include: equipment, reagents, animals, glassware, and even people. When developing a budget, I suggest that you focus on defining these resources and not on the financial aspects. Money often carries an emotional weight. Therefore, too much focus on money can dissuade a productive negotiation. A more productive discussion first defines the material resources needed, then determines how much those resources will cost and how these costs can be reduced. Negotiating is easier when both parties are clear on the goals and the resources.

Instead of creating a start up budget, create a start up list.

In this post we'll help you successfully negotiate a start up award by giving you step by step instructions on creating a budget, making decisions based on that budget, and negotiating in regards to the budget.

Creating a budget

We start by using your research specific aims. This is actually why a department/institute is interested in you. Your science will define your success. Therefore, it only makes sense to reverse engineer your budgetary needs from your experimental goals.

When creating your budget, you should take the following steps:

1. Define your timeline

Start with your thesis in mind. Imagine the kind of data your dream discovery will need, and how long it will take to publish based on these findings. Most often we suggest estimating the time it will take to secure your first (R-level) research grant. Set your timeline from there, then start identifying the resources needed to accomplish that goal.

How to negotiate a successful lab start up budget (CONT'D)

2. Identify the tools in that timeline

Avoid writing down prices as you create your list. This helps to ensure that all of the resources are accounted for. Write down all of the major equipment that you use in your current lab first. Generally, major equipment can be defined as equipment with capital costs greater than $5,000 but this can depend on the institution/ funding source. Major equipment includes large centrifuges, sequencers and analyzers, and any ultra sensitive equipment (RT-PCR, Microscopy, Fluorescence Scopes, Flowcytometers, etc.).

After identifying all the major equipment, categorize all of your minor tools, like pipets, or mini-centrifuges, etc. Be sure to capture as many of these tools as possible, this even includes clocks, timers, and phones.

As for reagents and consumables (such as pipet tips, glassware, etc), get a simple list from your current P.I., lab manager, or administrator containing all of the materials that you've used within the past year to get an idea of how much you can expect to use in the future.

3. Identify the skills needed to use these tools

Outline the knowledge and skill sets needed to do your science. This will help you identify the talent pool that you'll need to tap for your future research team. For example, if you're going to need a tech because you'll be doing mouse experiments, start defining keywords you'll want to find in candidates' resumes or CVs; "vivarium", "weaning", "colony", etc. This will help save time by screening out irrelevant candidates, and, more importantly, it'll help you define salary costs.

4. Ascribe a cost structure associated to these tools, skills, and personnel

Define pricing according to all of the needed materials, and resources that you've thoroughly identified. Do online searches, and seek advice from your current administrative services, managers, and techs' financial books.

To find personnel salary ranges, go to online job information sites (like, indeed.com, or salary.com). Search industry and academic job titles in the regions where the host institute is located. For example, salaries in Kansas versus salaries in NYC will vary widely. Therefore, start up awards should reflect salaries in the region you'll be working.

At this point, your budget bottom line costs may be rather high. That's normal, because this is where you can start to identify which items aren't critical to your research success. If you can get away with using computer modeling and collaborations rather than using animals, then that's a cost that you can eliminate from your budget. Every cut you make signifies that you've made a conscious effort to eliminate some of the excessive costs in your lab. That in itself is a strong negotiating tactic, and puts you ahead of most start-up P.I.'s.

It doesn't have to be complicated, or difficult to create this list. Start BEFORE searching for a faculty position. This is important to ensure that you're looking at institutes that have the means to support your work. For example, if your work requires specialized equipment, try finding institutes that offer shared equipment that you can use at a lower cost. Don't tether yourself to a lab that doesn't have what you know you need.

How to negotiate a successful lab start up budget (CONT'D)

Prioritizing resources in your budget

The simple practice of putting together a resource budget will help you focus on your research goals and hopefully remove some of the anxiety that comes with negotiations. This creates a self-assured discussion when it comes time to decide what resources to keep, and which ones to abandon. It's critical to make these decisions in the following order of importance:

1. First make decisions based on experimental timelines and specific aims.

2. Then make decisions based on financial values.

All too often, we see early investigators making unnecessary short term sacrifices that hurt their goals, rather than focusing on long term investments. For example, purchasing "used" equipment can save you money in the short term. However, the financial risks associated with old equipment, like service repairs, labour costs, and loss of time, can exceed the cost of the new equipment. That's why a resource budget can help you compare the monetary and empirical value that helps you determine whether or not to proceed with a used or new item. To further illustrate this point, if your research is dependent on a pathology microtome/cryostat, then making a careful decision on the condition and availability of the equipment is of utmost importance.

Conducting a successful lab startup negotiation

Now that you've completed a resource budget, and know how to decide which components are the most critical to your research, negotiations can be much easier. However, negotiations can still go horribly awry when several factors aren't taken into consideration.

1. Always focus on the science

When negotiating finances, instead of solely discussing numerical values, try to keep conversations focused on research relevant objectives and their tangible resources. For example, if a dean/chair asks "how much do you need to start your lab". You can respond by saying, "The exact start up costs may vary greatly. However, I have a list of what I really need in order to reach my research goals. Would I be able to get access to these materials?"

2. Always negotiate for a win-win decision

An institute/department is investing in you, and is counting on your research success. Your success is their success. Therefore, assume positive intent. Sometimes, "no we don't have the funds," really means they don't have the money. If the department has a strict budget, or a lack of resources, then ask for suggestions to meet each others' needs and limitations. Everything is negotiable. Try asking for discounts, collaborations, access to internal award applications, etc. If this is the institute that can help you and your research, then it's worth working within their limitations.

3. Always provide value to others

This is a non-profit organization. Therefore, collaboration and community is the ultimate value proposition. By

How to negotiate a successful lab start up budget (CONT'D)

preparing a budget before hand, you're saving the institute time and energy that would typically be wasted going through some of the questions we mentioned previously. There is value in the process of creating a budget; you can share your budget with fellow researchers and save them time in the future. Showing that you are willing to work and share with others will help prove that you will be an asset.

4. Always ask, "is there an alternative?"

As scientists, working with this question is second nature. Channel your inner curiosity and use your research training to help you find other solutions to reach your goals. For example, a junior investigator turned down a faculty position because none of the offering institutes were able to provide the resources required for him to meet his goals. Therefore, he turned from academia altogether and instead started a company around his own research. He was clear on his science, and found a solution. However extreme a solution may seem, you should consider it if it will help you achieve your research goals, even if that means saying no to a negotiation or, in this case, to academia altogether.

The primary point of a negotiation is to create a win-win solution for the success of your science. If the resources aren't available, then you're entering a win-lose situation that can ultimately set you up for failure.

Don't be afraid to walk away from a negotiation. If securing a faculty position is your goal, then a resource budget negotiation is a moot discussion. However, if being a successful independent scientist is your goal, then understanding your needs is critical to a successful negotiation and collaboration.

Happy Sciencing,

Damien

Chapter 4

Getting the job

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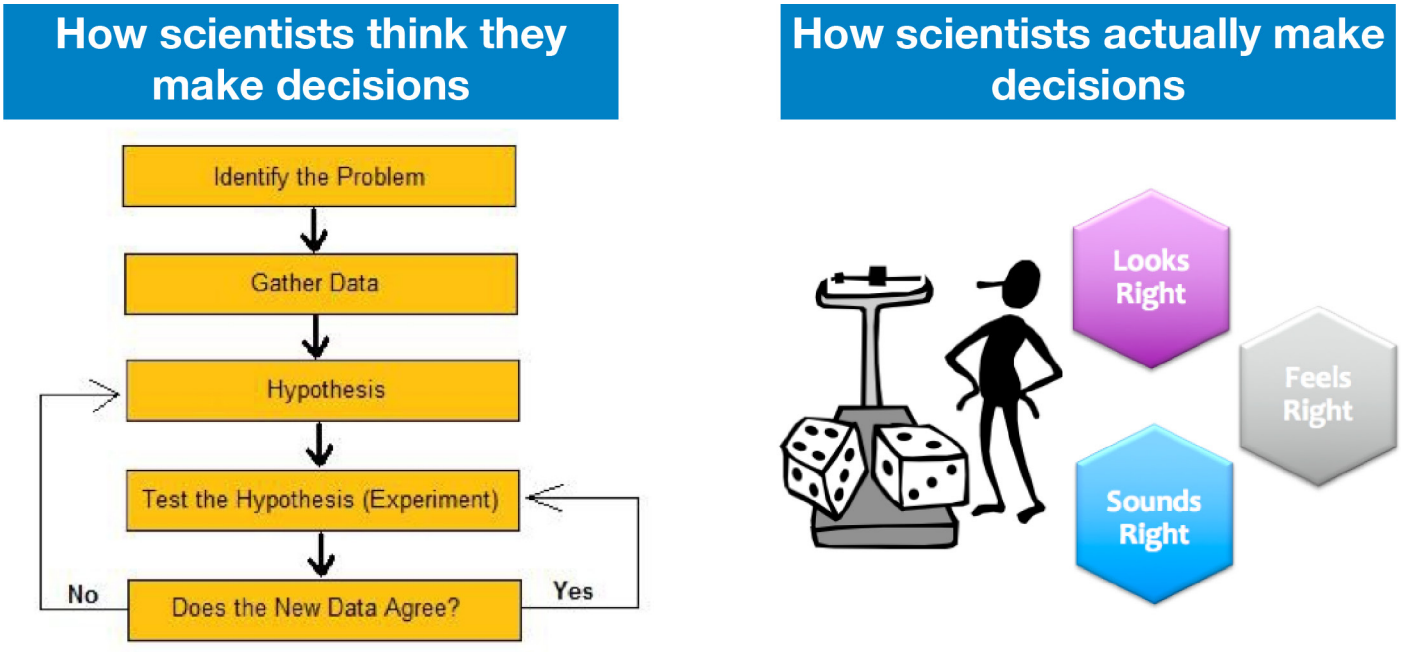
Is this the right place for me? 8 tactics for choosing a lab

By Joanne Kamens | October 2, 2018

Why is choosing the right lab such a big deal? It's actually something you CAN choose and it will make a huge difference for your future career and life. You might see a lab head as choosing you, but in reality, you are giving your hard work and talent for many years (at a very low salary I might add). You have a right and responsibility to choose a lab where you can thrive and do your best work. This post is focused on choosing a lab, but almost all of these guidelines can apply to any workplace or job. It amazes me when the most analytic scientists seem to toss data-driven reasoning out the window when making decisions. We think scientists make choices based on logic and reason, but often our decisions are based on emotions and assumptions. I'm not just talking about simple things like "Which route should I take to get to work?"; we often make important life decisions without much logic - even choosing a training lab where we will spend the next 6 years.



Know yourself

I rotated in 3 labs before choosing a graduate school lab. All the lab heads were amazing scientists, but the labs were profoundly different. My first rotation was with a mid-sized lab with an experienced mentor. The lab was very, very quiet. Everytime I asked a question, I felt like I was yelling. I imagined 6 years of biting my tongue and gratefully moved on. My second rotation was in a big lab with a famous PI who I was only likely to see once a year. There was lots of hustle and bustle, but the lab was very competitive and not very communal. That didn't suit my collaborative learning style at all. Finally I rotated in a small lab with a new PI. I realized that as a first born child, I would thrive on this level of attention and interaction (and I did).

Some of the information you will need is about you. It's worth taking time to honestly evaluate your own style of work and communication before making this important decision. I'll highlight some of these questions in the sections below. Mentoring relationships can help identify your priorities and needs, but sometimes it just takes introspective thought on what's worked for you and not worked for you in the past. For all of the factors I touch on

Is this the right place for me? 8 tactics for choosing a lab (CONT'D)

below, the first question to ask yourself is "which ones matter to me?" and hone in on the factors that will make the most difference for your success.

Gather data

How do you find out what the lab is really like? Gather data of course. Ask questions. Prepare by going sleuthing on the lab website, publication records, LinkedIn, Researchgate or Twitter. Be ready for the interview with a long list of written questions for the PI and lab members. Make coffee or beer dates to talk to as many lab alumni as you can or schedule video/calls if they are not local. Alumni meetings can be the most informative way of gathering data. Former lab members can give open, revealing information about the culture and lab head. While it's good to talk to new lab members too, they may not have had experience writing, publishing, or discussing career opportunities with the lab head. Former lab members can give you a fuller picture. Consider talking to people in the lab across the hall or in the same department as well. What do they have to say about this lab's reputation?

If you are choosing a training lab, I strongly suggest you complete a work rotation in the lab if at all possible. If not, see if you can spend a day or two hanging out around the lab and especially try to attend a lab meeting. Observe how the lab members treat one another (especially those low on the totem pole). Can you see yourself enjoying this atmosphere?

Size matters

Yes, yes it's all about the science but really it's not. It's about the atmosphere that will allow you to thrive. How big is the group? Has it grown over time? If not, why not? It may not be a bad thing if the lab has stayed that size on purpose, but it could also be a sign that the lab head has trouble attracting scientists. To get a better idea of why the lab is the size that it is and whether or not it will work for you, ask questions like:

- Do lab members feel there are enough projects to go around?
- What is the energy level in the lab? Does a frenetic atmosphere make you edgy or energized?
- Are you an only child and used to a lot of attention? Or are you one of 8 children and used to getting the attention you need?
- Are you good at asking for help? If you are good at asking for and getting help, size might not be a big factor for you.

Know who's boss

You sign on to a lab for the mentoring only to find out that the lab head is an absentee advisor. They are always traveling, or too busy to interact regularly with the newer lab members. You must get an idea of what to expect and decide if it is what is best for you. Some of these important questions will be easy to ask the lab head, and some are better asked of other lab members. Ask things like:

Is this the right place for me? 8 tactics for choosing a lab (CONT'D)

- Is the lab head really around and accessible for advice and input?
- Will a postdoc or lab manager be your actual mentor? Is there a chance the supervisor will be moving on soon?
- Will you get to meet one on one with the lab head? Are meetings with the lab head regularly scheduled or only ad hoc?
- Does the mentor keep appointments with group members or are they frequently cancelled?

Choosing a role model

Make sure the mentors you choose are teaching the stuff you want to know and display character traits and skills that you hope to grow. Find mentors who take their responsibility to train you seriously. Why work for someone who you don't look up to and who doesn't care about your career development? To get a better idea of whether or not a lab head is a good role model, consider questions like:

- How long do lab members stay around? Is it too long or do they leave prematurely?
- Do lab alumni stay in the same field taking projects with them and remaining close colleagues of the PI? Or do lab alumni leave the field or get pushed out by the PI?
- What is the management style? How does the PI deal with conflicts in the lab? Do they motivate with the appropriate balance of encouragement and criticism?
- Do they encourage diversity in all forms?
- How are their organizational skills?
- Are they involved with colleagues and the department?
- Are they successful at getting grants and funding?

Beware of bullying

Your mental health and success in science will directly depend on your science mentor. One scientist who followed my advice to interview alumni of the lab was told that the PI removed a woman from the appropriate first authorship position on a publication of her project and made another lab member first author because they "needed it more". My friend didn't heed this warning and profoundly regretted it when the same thing happened to her a year later. I hear too many science trainees get warnings and still think "but that won't happen to me, I have a backbone". The sad truth is, if it happened before, it almost certainly will also happen to you. As you speak to lab members and alumni, don't ever disregard warning signs of unethical behavior, harassment or bullying.

Even with the rise of movements such as the Future of Research Symposium and #MeTooSTEM, academic bullies are hard to stop—they often have no boss or management structure to demand better behavior. I'm not saying you have no recourse if you end up in a bullying lab, but by far the best thing to do is not go into these labs in the first place. This is another reason to do your research and choose wisely.

Is this the right place for me? 8 tactics for choosing a lab (CONT'D)

From the Tenure She Wrote blog, Toxic Academic Mentors.

What is workplace bullying?

- Threats to professional status – including belittling opinions, public professional humiliation, accusations regarding lack of effort, intimidating use of discipline or competence procedures
- Threats to personal standing – including undermining personal integrity, destructive innuendo and sarcasm, persistent teasing, name calling, insults, intimidation, sexual harassment
- Isolation – including preventing access to opportunities, physical or social isolation, withholding necessary information
- Overwork – including undue pressure, impossible deadlines, unnecessary disruptions
- Destabilization – including failure to acknowledge good work, allocation of meaningless tasks, removal of responsibility, repeated reminders of blunders, setting target up to fail, shifting goal posts without telling the target
- Warning signs while interviewing: Lab members speak disrespectfully of supervisors and/or each other. You are not allowed to speak to lab members alone during the interview period. People seem to be hiding their work and are nervous about discussing data. There's hesitation before answering questions about lab culture.

Support for diverse career paths

I hope by now you are aware that the majority of PhD scientists will not actually follow the academic career path taken by their training lab mentors. ~80% of you will be in jobs outside of academia 10 years after your training. You must ensure that you are expanding your options and preparing for both academic and non-academic career paths. I can't say this strongly enough - don't choose a mentor that sees you only as a paper making machine. Choose one that is a true mentor, supporting career development and growth.

- Have lab alumni gone into both academic and non-academic careers?
- Will you be encouraged to develop transferable skills by attending career events or being involved in a grad or postdoc association?
- Will you learn how to run a lab if that is your aspiration? Will you help or at least observe grant writing? Get equipment quotes? Understand administrative responsibilities?
- Is the work (topic and/or technical aspects) applicable to industry if this path interests you (e.g. human disease or models of disease, drug properties, etc.)?
- Will this lab help you head for a career in drug/device development? Does the advisor have industry connections such as serving on Boards? Does the publication record show evidence of industry collaboration?
- If you are considering a career at a small, teaching college you might want to consider less expensive, portable areas of research (transgenic mice—out, zebra fish—in)

Is this the right place for me? 8 tactics for choosing a lab (CONT'D)

Team attitude vs. dog eat dog

Which one is better for you? Maybe you like things a bit hectic and challenging and this drives your best work. Or is it teamwork that brings out your best performance and learning? Everyone's different so give some thought to what atmosphere makes you successful

Table 1: Collaborative vs. competitive lab environments

Collaborative	Competitive
Papers have multiple authors	One author plus PI on most papers
Productive external collaborations	Reputation for not being open
PI helps lab members determine project "ownership" and author order	PI lets lab members fight it out
PI intervenes if there are interpersonal conflicts	PI has no idea who is dating whom

Expanding your skillset

Scientists are lifelong learners. I believe we won't be happy if we aren't learning so before you take any position you must make sure there will be a way to grow and learn. Graduate students and postdocs in particular must care about this. The training you get now will have a big impact on everything you do in the future. Questions to ask:

- Will someone(s) train you technically?
- Will the PI/supervisor look at your data and suggest follow up experiments regularly?
- Can you work on some experiments of your own choosing?
- Does the PI keep up on the literature and pass on relevant papers?
- Will you have access to information from other labs with skills that you can learn?
- Do lab members work on more than one project at a time or over their stay in the lab?
- Do all lab members attend scientific meetings (and present)?

Is this the right place for me? 8 tactics for choosing a lab (CONT'D)

Making the decision

Try to rotate or interview in more than one lab when you choose a grad school or postdoc lab. Having a comparison can be very helpful in uncovering strengths and weaknesses of the options. Use this blog as a guide. Start a document to record notes and observations so you have data to review when making a decision. If you don't see a culture you want to contribute to and learn from, keep looking. The right lab for you is out there if you take the time to evaluate the options critically. How will it feel when you find it? If you find the right lab, some days it won't even feel like work. Scientists love learning and science so find a place that loves you back.

Is this the right place for me? 8 tactics for choosing a lab (CONT'D)

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9 tips for a successful postdoctoral experience

By Erik Snapp | October 9, 2018

Today's postdoctoral fellows (PFs) face a number of challenges ranging from long periods of training to limited job opportunities in academia - the main reason most people enter postdoctoral training. Similarly, there are several factors to consider when selecting a postdoc mentor and lab. These topics have been addressed in numerous essays and workshops (see the Careers essays in the journals Nature and Science, for example).

This blog post is about how to get the most out of your postdoctoral training experience. If you're going to commit to doing a postdoctoral fellowship, what are you signing up for and how can you do it well? Below, I briefly describe some tips for a successful postdoc fellowship.

1. Reverse engineer success

On Day 1 of your postdoctoral experience, define what you need to achieve your intended next career stage and create a timeline for achieving these goals. Planning is often more easily done in reverse. Assuming you want to become competitive for a Group Leader position, what will you need?

- Multiple first or corresponding author publications (published, not in preparation)
- A history of successful funding (fellowship grants)
- A project with sufficient preliminary data to establish your own lab and get an independent investigator grant (e.g. an R01 from the NIH, in the United States)
- Strong letters of reference that attest to your talent and expertise as a researcher. Depending on the position, you may also want some evidence of teaching experience.
- How do you get there and more practically, when do you need to be there? A typical biomedical postdoc fellowship lasts five years. Most universities and institutes annually advertise for Group Leader positions starting in August, the year before the position would begin- for you, at the beginning of Year 5.

Now work backwards. To publish a submitted manuscript in a high-profile journal typically takes 6-12 months depending on the revisions and the amount of time spent shopping a manuscript. Manuscript writing can take weeks to a couple of months and requires that all of the experiments have been completed. Therefore, to be ready to apply for a Group Leader position, key first author manuscripts need to be ready to write by Year 3.5. Thus, it is critical to get an experimental system up and running very early on. Once your system is working, you should maximize data production with the end goal of having sufficient data to write a manuscript. Consider questions like: What figures are missing? For example, are additional controls necessary? As you build your story, are additional data needed to rule out alternative models or to strengthen your new model? PFs need to be regularly thinking about manuscripts.

The other items will follow. If you get more publications, you will be more competitive for fellowships. If you explore your system more, you will have a better idea of how to leverage it to ask new and interesting questions in your own lab.

2. Seek multiple mentors

At the end of grad school, you searched for and eventually identified a postdoctoral mentor. A good mentor typically writes the grants that fund your research, guides the research directions of the lab, gives you constructive feedback on your research, and teaches you how to write as well as mentor. Yet, even the most

9 tips for a successful postdoctoral experience (CONT'D)

dedicated mentor is not always available for mentees due to travel, teaching, grant writing, etc. Also, it is unlikely that a mentor has the only relevant expertise and perspective for your project. Furthermore, Group Leader position applications require 3 letters of reference- the graduate school mentor, the postdoctoral mentor, and at least one more person that knows you and your research well. Who could fill these different roles? A second or third mentor. Therefore, seek out additional mentors. I found this beneficial for my projects, my training, and when I went on the job market. Additional mentors are not so different from having a thesis committee in graduate school. Thesis committee members provide expertise in designing and interpreting experiments, as well as career guidance.

In my own experience, great mentors often can be found during conversations with senior investigators. Discussions can reveal mutual scientific interests, complementary perspectives, a shared communication style. You "get" each other. The other factor is how available the potential mentor is. If the person makes time for you, as needed, this is a strong indicator that this person cares about your science and your development. Taken together, all of this means that you need to introduce yourself to and talk with more senior scientists.

3. Work intensely, but intelligently

Before you do your first experiment in your new lab, stop and plan it out. Some questions to answer include:

- What is the goal of the experiment?
- What are the anticipated outcomes?
- What are your controls?
- Will these controls enable you to interpret your results?
- Will the experiment actually answer your question?
- If you're using a new protocol or reagents, do you understand all of the steps?
- Do you know how the reagents have been validated?
- How will the results fit into a future manuscript?

You could easily spend a day or a week planning an experiment, even a relatively simple experiment. However, by taking this time, you can help ensure that you understand the methodology and can have confidence in the reagents and outcomes. This is preferable to finding out you've been doing something all wrong or that a reagent has not been convincingly demonstrated to work for your specific assay. "Quick and dirty" experiments often eat far more of your time as they can result in spurious yet intriguing findings that fail to replicate. Plan experiments logically and strategically to increase your rate of productive results and thereby help decrease the time to your first manuscripts.

4. Balance focus and exploration

Researchers face a fundamental conflict. Science is about exploration, discovering new information. There are literally infinite questions one could pursue and experiments to perform. It is tempting to pursue a new line of inquiry that arises from an unexpected experimental result. First, your main project may seem stuck in a rut. Second, many of the great discoveries in science arose from surprising findings when studying a seemingly unrelated problem.

9 tips for a successful postdoctoral experience (CONT'D)

However, you have finite time and resources. You typically have 4-5 years to make discoveries and publish papers to position yourself for a job search. Therefore, you must balance these competing goals. Knowing when to follow a lead and when to terminate a project are fundamental skills that all group leaders must master. While the calculus of these decisions is complex, here are a few guidelines to help you evaluate projects:

- If all of your experiments work as predicted and you get the result you anticipate, what is the best possible outcome, e.g. where could you publish this and how important is the result?
- Is there a tractable question or are you simply describing a phenomenon? Exploration can be important, but it is equally important to have a plan to get to a mechanism.
- Do the necessary tools exist to tackle the problem and if so, do you have ways to access these tools? Plenty of questions concern great scientific problems, but the technology may not exist to answer the question or it might be extremely difficult for you to get the needed tools and/or expertise.

5. Present your work often

Surprisingly, many PFs are reluctant to give talks or posters about their research. They dread giving a departmental seminar or a joint lab meeting. I've been told that PFs feel like it's too much work, they don't like speaking, they don't feel like they get useful feedback, and they don't feel like they've made enough progress since the last presentation.

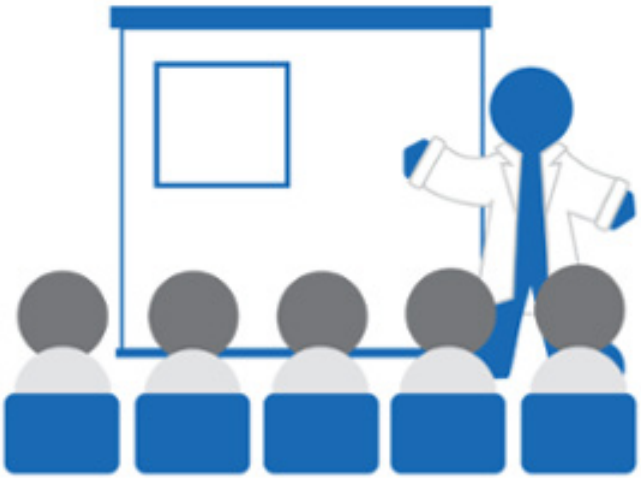
Yet, PFs need to tell and sell their stories to get jobs. PFs (and mentors) can never be too well practiced or too skilled at presenting and answering questions. Organizing a thoughtful, engaging talk takes significant effort. It requires evaluation of all of the data and any recent relevant studies in the literature. Plus, presentations benefit from practice.

If you simply recycle slides from the last time you gave a presentation to a specific group and tack on a few new

9 tips for a successful postdoctoral experience (CONT'D)

pieces of data, your talk will probably not inspire you or the audience. Ask yourself:

- What is the most exciting story I can tell with my data?
- Can I make better slides that more effectively tell a story?



Generally, the answer to the second question is yes. As you get better at telling your story, you can find clearer ways to consolidate or present your data. You can create more detailed or functional models or more helpful background slides. If you don't have much new data, speculate on what you hope to accomplish and how your research fits in with the current literature. Finally, if you give your talk or poster to enough different kinds of audiences and if you pay attention to how the audience responds to your presentations, you will become a more confident and skilled speaker.

There's a more fundamental reason to give presentations - networking! People get to know you through your presentations and will be able to provide letters of reference, informal recommendations, more positive grant application and manuscript reviews, etc. You'll also meet future collaborators and get access to unpublished information and reagents. Part of the reason I got my first faculty position was because the search committee asked someone at my institute about me, even though I had not asked this person to write a letter of reference. The group leader had attended my department presentations and could speak knowledgeably about my research and my abilities. Word to the wise: Do NOT be the group leader candidate that people in your postdoc department do not know....

6. Go to science meetings big and small

Meetings give you and your research exposure. Use meetings to introduce yourself to and interact with the members of your field, and present your research. Face to face meetings can make favorable impressions on potential manuscript or fellowship reviewers, expose your research to search committees, and can lead to mutually beneficial collaborations.

7. You cannot get too much practice writing

Young group leaders are rarely great writers. There are two ingredients to becoming a better writer. First, practice often. Seek opportunities to write manuscript drafts, reviews, cover letters,

9 tips for a successful postdoctoral experience (CONT'D)

fellowships, etc. Second, get constructive feedback from experts. If someone crosses out something, find out why. Ask successful writers about their strategies for organizing and self-critiquing their own writings.

8. Learn to mentor, manage, communicate, and teach

The dirty secret about becoming a group leader is that people are typically hired for a job that is orthogonal to their scientific research skill set. You'll need to motivate your trainees, communicate your expectations, and teach classes. Therefore, seek out management and conflict resolution workshops. Get teaching experience and learn about modern pedagogy techniques, especially active learning. Serve as a daily mentor for a summer undergrad, rotating grad student or high school student. Learn to teach how to design, perform, and interpret experiments. You'll be better prepared for your future intended career and you'll become a better scientist in the process.

9. Avoid burnout

The suggestions in this blog add up to a substantial amount of time- most of your waking hours. This is doable and it's a preview of what you are signing up for as a group leader. That said, being a PF can be exhausting. Now is the time to develop strategies to rest and re-energize yourself, and to address all of the other parts of your life, which, inconveniently, do not take time off when you are a PF. Here is my personal list:

1. Exercise - nothing dissipates stress and improves your perspective like intense exercise. I highly recommend running or biking or something that demands your attention.

2. Eat well - a diet rich in vegetables, foods with minimal processing, and low in empty calories will make you feel better and help maintain your health.

3. Have a hobby - do something that gets you away from thinking about the lab and provides a sense of accomplishment. Experimental successes can be infrequent and a hobby that provides instant gratification can help boost your ego in between scientific achievements. I've found cooking, gardening, hiking, and photography to be very satisfying.

Finally, many PFs are in committed relationships and/or have started a family. Those people are your support network, so remember to thank them verbally and often for their love and support.

9 tips for a successful postdoctoral experience (CONT'D)

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Experimenting with new careers while in grad school

By Melanie Fox | February 25, 2016

It's not always easy to figure out what you want to do after graduate school, at least not while you're still in the thick of it. About three or four years into my PhD in Molecular Biology, I realized I wanted a career in science outreach: engaging the public to promote an awareness and understanding of science. Like most science PhD programs, mine was geared toward careers in academia or industry. Luckily, I discovered that there are many ways to get a taste of a variety of careers while still working towards your degree. For me, experimenting with the career and networking opportunities available to me as a graduate student culminated in my founding a nonprofit called Central Indiana Science Outreach, or CINSO. We organize fun science events for adults and professional development opportunities for researchers interested in connecting with the public. My experiences in grad school, though often called "nontraditional," helped prepare me to start CINSO. Here, I share some of the tips I learned along the way and hope they'll help you make the most of the opportunities you're provided throughout your PhD program.

Find people who will support your professional development

I had a wonderfully supportive mentor and graduate office. I cannot stress how important they were to my success as a student. They didn't always know the best direction to guide me because they had no experience with my career path, but they had my back.

If your advisors are not as supportive of your career goals, find people who are. I wanted to do fun science activities with the public, so I reached out to people who were educating the public and organizing events. I contacted local professional organizations and nonprofits. I volunteered at events like Celebrate Science Indiana and sent emails to any group with a "Contact Us" button on their website. Then I had a lot of coffee with potential new friends. Without the encouragement and pep talks from these contacts, I would have quit my "nontraditional" career path long ago.

In our first year, CINSO has hosted fun activities at several events and holds a monthly public lecture series. We are currently organizing a science festival as part of the international Pint of Science festival held at pubs across the world for three nights a year.

Use your analytical mind to test and discover what career suits you best

I began viewing my activities as types of experiments. I searched for new opportunities with an open mind and open ears. Everyone I talked to provided new data. Every new experience taught me something about myself and my future career. If it wasn't something I liked – well, I was used to experiments not working, so just like in lab, I sucked it up and moved on to the next thing. If I made a mistake, I evaluated what lessons I had learned – call it "troubleshooting." Trying out new experiments and new ideas is nothing new to a scientist. Framing my

Experimenting with new careers while in grad school (CONT'D)

efforts in these comfortable terms helped guide me through the process.

As I mentioned, my graduate office staff was amazingly supportive. I talked to them about my interests and my ideas all the time. Once, I had this crazy idea that I needed help with: wouldn't it be fun to get several of the labs in our program to write short, funny, picture-filled blog posts about their research? Then we could get everyone to share their articles on social media and have their friends vote for their favorite. This seemed like a great way to share some of the research taking place at our university with the community. I even spray painted a small erlenmeyer flask with gold glitter spray paint to make a trophy for the winner. We promoted the contest for about two months, and we got one submission.

I was a bit disappointed in the lack of participation, but I decided to focus on what the experience taught me. The article submitted was hilarious, full of interesting information, and received a lot of attention on social media. I gained a concrete example to use to promote future attempts and learned a bit about recruiting scientists to outreach.

I tried to organize a Buzzfeed-style article contest through my program. We got on (excellent!) submission called "8 Cuddly Creatures and the Dark, Deadly Diseases They Carry." Not a resounding success, but people enjoyed reading it, and I learned a lot. Source: https://borntoscience.com/2015/05/18/8-cuddly-creatures-and-the-dark-deadly-diseases-they-carry/.

Try new things

Take Advantage of Opportunities Provided by Your Programs and Departments

Graduate school was an excellent time to try new things, develop new skills, and meet new people. There were visiting seminar speakers each week, my department and graduate office arranged opportunities to meet with various professionals, and there were multiple avenues for professional development including workshops and networking events. I took advantage of as many of these resources as I could. Networking and learning from the careers of others were key to creating my career path. Luckily, in grad school much of the up front work was

Experimenting with new careers while in grad school (CONT'D)

done for me. I just had to take advantage of it.

Blog and Tweet

I started my blog, Born to Science, as a graduate student, and I love it. I am able to write about any topic I like and gain experience in communication, editing, marketing, and website organization. My short experience with my blog helped immensely when CINSO started brainstorming the resources we wanted to provide online.

I had a quart of strawberries that were bad, so we extracted their DNA and blogged about it. This over-the-top demonstrations caught the eye of people who wouldn't normally be drawn to such a simple kitchen experiment. Source: https://borntoscience.com/2015/05/05/strawberry-dna-extreme-home-edition/.

Twitter is an excellent resource that has gained a lot of traction with researchers. It is an excellent way to meet people with similar interests! Especially as someone interested in doing science outreach, not only can I easily share science with the public, but I can watch and learn from the experts in science communication in real time! I follow great online science communicators like Phil Plait @BadAstronomer, Emily Graslie from The Brain Scoop YouTube channel @Ehmee, and David Shiffman @WhySharksMatter and see what kind of content they share and produce and how they interact with their followers. It's also been a great place to reach out to local establishments such as museums, professional organizations, and other nonprofits to gain support for CINSO. For instance, I tweeted to the Indiana State Museum and others when I was trying to find local informal science educators, and ever since, the State Museum has been the best supporter and most productive partnership CINSO has had.

Volunteer

The turning point in my graduate experience, the point at which my career path began to take shape, was when I started volunteering. I wasn't sure yet what a career in science outreach would look like for me, but everything I read from career guidance sources such as myidp.sciencecareers.org mentioned museums. Indianapolis is home to one of "The world's biggest and best children's museum", The Children's Museum of Indianapolis.

There are dinosaurs escaping the building! Source: https://www.theclio.com/web/entry?id=17419.

I drove passed these dinosaurs every day. They made me happy. Grad school can provide plenty of negativity, so I volunteered at a place that made me happy. I started volunteering in the "Dinosphere" almost every week. I gained experience explaining science to visitors of all ages, learned a lot about the

Experimenting with new career while in grad school (CONT'D)

dinosaurs, and met wonderful people.

When I started volunteering, I was worried about becoming one of those angry, disappointed graduate students because I wasn't sure what I wanted to do. A few weeks into volunteering, I was talking to a little girl about fossils. After we talked for about ten minutes, she said, "Boy, I love science," and I realized, I still do too! Beyond the outreach experience I gained from volunteering, it gave me a place to go once a week to get recharged. The fun change of pace helped break up the negativity and allowed me to focus on the positive. I went back into lab the next day and remembered why I still love science.

Keep building on your time in graduate school

I graduated in the fall of 2015 and am able to look back at a positive, fulfilling experience. I still use my network and graduate school resources daily to promote CINSO events and recruit speakers and participants for our professional development programs. I also reach out to my network to find guidance through developing and leading a budding nonprofit, something I had zero experience with before founding CINSO. Now, the network I built during graduate school is my informal advisory board. Although my goals may not have been "traditional," I was able to fully take advantage of my graduate experience.

Further Reading

I asked some colleagues to share valuable life lessons they have learned during their scientific training and wrote about them in a blog post on Born to Science:

- Life Lessons from Scientific Training

More and more voices of encouragement emphasize the important roles of scientists outside of academia One recent example:

- Don't call me a dropout: Why science needs more people to quit the lab.

Gaining leadership skills volunteering at a professional organization

By Juliet Moncaster | August 6, 2015

The National Postdoctoral Association (NPA) outlines 6 Core Competencies that all postdocs (but also PhDs) should develop.

Among them "Leadership and Management skills". The NPA states that Postdoctoral scholars should have the skills and techniques needed to facilitate effective teamwork, manage day to day operations within their workplace, and pursue leadership opportunities at the local, institutional, regional, and national levels. These skills will also help the person mentor others more successfully.

But how does one gain such experience? Your institution may offer occasional workshops on leadership and management skills but a longer term and more substantial experience can be achieved by volunteering for a professional organization or a scientific society in your field. My leadership training began with the NPA where I gained invaluable experience working on and later chairing the Advocacy Committee. I'm now furthering my leadership experience working at the Association for Research in Vision and Ophthalmology Research (ARVO). Hopefully sharing my experience will show you how you can get started on your own development as a leader.

Nobel Prize for Fluorescent Proteins

A small number of Advocacy committee members at the National Postdoctoral Association annual meeting 2015.

I was Chair of the Advocacy Committee at the NPA for 5 years and just recently stepped down. I have gained invaluable experience and even after 5 years, was still improving my skills. My involvement with the NPA began gradually. I didn't become Chair of a Committee overnight (however this can be done if you already have some

Gaining leadership skills volunteering at a professional organization (CONT'D)

leadership experience). I was involved with postdoctoral issues first at Brigham and Women's Hospital/Harvard Medical School and then Boston University (institutions where I've worked as a postdoc). I soon realized that many of the issues faced by postdocs and institutions are not local but are national issues. I applied and was successfully granted a travel award to attend the annual NPA meeting to learn more. Having met many people at that conference, I later became involved with the NPA beyond the meeting. I first joined a committee as a volunteer member. The NPA runs its committees through Chairs and Vice-Chairs that lead them. As a committee member, I volunteered for various tasks as things came up. For example, I updated some sections of the NPA's website.

By volunteering, you can gain experience working with other people mostly online and on monthly phone calls. This has its challenges as meeting in person is often much more productive and makes it easier to build relationships. Nonetheless, the committees would not function without long distance communication and learning to work with people despite the distance improved my verbal and written communication skills. Volunteering on these committees was real work; meetings usually resulted in actionable tasks and I made a point of sticking to deadlines and performing the work I agreed upon (just as I would in my laboratory work). Committee members have to work professionally with the other members on the team and keep the Chair and Vice Chair of the committee updated with their progress. Having effectively worked within the committee, I became Vice-Chair when the current Vice-Chair stepped down. When the Chair then stepped down, I became interim Chair automatically as it was an understood expectation of any Vice-Chair. Following an official assessment and discussion with the Board of Directors, the Board officially voted me in as Chair of the Committee which I then led for 5 years.

Different leadership styles

Being an effective leader requires you to understand how to work with many different types of people both above and below you. During my time at the NPA, there were many changes to the Board of Directors and the Executive Director changed twice. I had to learn how to adapt to different situations and, in particular, to different styles of leadership. As the Chair of the Advocacy Committee, I had to report to the Board of Directors and liaise with the Executive Director. As members changed, I had to learn how to develop new working relationships with these individuals who often had different styles from their predecessors. Changes were implemented and I had to adapt accordingly. For example, the quarterly and annual reports I had to write on behalf of the Advocacy Committee would change format depending on the particular style and requirements of the new Board Members. In some instances I felt like I was going back to previous formats but I learnt to overcome the personal frustration and submit reports in the format requested which in the long run was most beneficial for the organization as a whole. I came to understand that not only was I growing as a leader but the organization was growing too and with that would come necessary changes.

I also learnt to adapt my leadership style according to the needs of my committee members. Some members would need much more guidance, direction, and a clearly laid out plan of action. Others would act more independently and some others would need regular re-direction and alignment with the overall mission of the NPA. You must accommodate many different types of people in order to effectively harness their strengths.

Gaining leadership skills volunteering at a professional organization (CONT'D)

Leadership responsibilities

Being a leader in an organization, you need to make sure the organization speaks in "one voice" whilst among individual members, many opinions may exist. I learnt to try and bring a group of people to an overall consensus and developed negotiation skills that would be useful in many careers. I learnt that the overall voice may not always be perfectly aligned with my personal viewpoint but, as a leader in the NPA, I had to speak as an NPA representative and speak the NPA's stance. I had to be professional as I represented the organization, not just myself as a scientist. I learnt to wear different hats and came to understand the responsibilities that come with leadership.

The NPA was a great organization to develop these leadership skills in particular because every year it organized a "Committee Leadership Institute" (CLI) where each Committee Chair and Vice Chairs were invited to spend a weekend together. These "leadership institute' weekends, funded by supporters such as the Burroughs Wellcome Trust, would entail intense training to develop our leadership and management skills. The NPA brought outside experts and many hands-on- and role-playing exercises were held during the weekend. I attended multiple CLIs and benefited greatly by improving my skills and sharing with other more junior leaders what I had experienced and learnt.

Opening doors to further opportunities

Having gained leadership skills and advocacy experience with the Advocacy Committee of the NPA, further opportunities opened up to me. As I spoke about my work with the NPA, I was ultimately invited to join the Advocacy and Outreach Committee within a professional society in my scientific field - ARVO (as mentioned above). I became an official member of the Committee and after a year of my active involvement, I am now Chair-Elect of that Committee. Being part of this organization will not only further develop my leadership and advocacy skills but will also put me in closer connection with other leaders in my research field should I decide to remain here.

In a time when it is so important for postdocs and graduate students to think about their career options, gaining transferable skills such as leadership skills can only assist you and make you more qualified for future career opportunities. Becoming involved is not too difficult and you can find opportunities around you. You just need to be prepared to take on the challenges and be proactive and engaged once you are in a leadership role or in a track towards one.

9 Tips to achieve success in academia

By Margo R. Monroe | Aoril 1, 2014

In this section we've interviewed Addgene depositors who are at various stages in their careers to get advice on choosing a lab, picking your research topic, starting a lab, and more. Before we start, we'd like to extend a special thank you to Dr. Tom Ellis (Imperial College London), Dr. Connie Cepko (Harvard Medical School), and Dr. George Church (Harvard Medical School) who took the time to answer our questions.

Advice for success in academia

How can we shape our time in academia to maximize productivity and success? We asked leading professors for their top 3 tips.

Tom Ellis

1. Keep up with the literature. He recommends setting up a few PubMed email alerts for new papers with keywords or a Table of Contents email (eTOC) alert for every new issue of your favorite journals. "If you don't read, you're doomed."

2. Always be sure to include various positive and negative controls to "convince [any] old skeptic professor who's seen every spurious result under the sun. Academia is about convincing results, and nothing is more convincing than showing that your experiment is definitely not a fluke."

3. Engage in various projects and help colleagues with their work. "Your one project may be awesome but there's a chance it'll never work. If you help others out, they'll help you too; both with your research and with getting published."

Connie Cepko

1. Work hard. There will be periods when opportunities arise. "Grab it!"

2. Don't get caught up in the hype.

3. "Passion gives you energy." What is your passion? Even if no one else is excited about it, distinguish yourself with this passion. "Love what you are doing!" It helps when the time comes to work with full force.

George Church

1. "Initial and sustained motivation is a huge component of success."

2. "Enjoy Teamwork." Be friendly, open, sharing, rather than intensely competitive. Be curious and interdisciplinary.

9 Tips to achieve success in academia (CONT'D)

3. "There are many different ways to succeed – as loner or gregarious; dictator or laissez-faire; theory or practice; business-like or artistic; tech, anti-tech or pragmatic."

Advice for pursuing careers outside of academia

Recently, graduate students and postdocs have become more aware of careers outside of academia. How do PIs assist their mentees who have goals outside of the university?

Ellis recommends that a student interested in leaving academia should present their research at conferences to obtain a "crash-course in all the real life skills that employers love PhD students to have: working to deadlines, writing up clear and attractive reports, being good at presentations and of course, networking and collaborating." Getting out of the lab also "opens the student's eyes to the many different jobs associated with science, especially if the conference is a big multidisciplinary one."

Cepko strongly emphasizes that people should "follow their passions, be happy, and match their personal goals to their career choices." She points out that a PhD teaches analytical and critical thinking skills that are applicable to a variety of careers outside of academia. She has had previous graduate students and postdocs go on to work in patent law, business development, teaching, etc.

Church also encourages his mentees to follow their passion. "There are many ways to have a large positive impact in society. We need much, much more science and engineering (STEM) expertise in law, business, journalism, entertainment, politics, K-12, etc."

Addgene's team includes many PhD scientists who have stepped away from the bench, but who remain connected to scientists and use the skills they learned during their studies. They suggest that you make time for extracurricular activities both to develop new skills and to discover what you are truly passionate about. Check out my previous post if you're looking for more information about the benefits of pursuing extracurricular activities.

Success evolves from passion

True success evolves from heart and hustle. Each PI emphasizes the importance of passion, hard work, collaboration, and staying honest with personal goals.

Tips for getting a faculty position

By Erik Snapp | June 22, 2017

Eight years ago, I decided to write a "how to" manual on applying for faculty positions in biomedical science. My motivation was to share my experiences from my own job search and my time on faculty search committees. Having successfully navigated the trials and tribulations of the process, I've provided guidance and mentoring to several people that found my insights helpful. All went on to get faculty positions at top state colleges, private universities, and medical schools.

I will emphatically deny that I have a magic formula to guarantee a reader the faculty job of his/her dreams. There are too many moving parts in the whole process to distill a one-size-fits-all recipe for success. What I can promise is that my suggestions can help you make the best case for your candidacy. A major reason that a lot of candidates either get no interviews or get several interviews, but no job offers is a failure to clearly articulate one's talents and ideas. Some key points from my ebook, "Applying for a Faculty Position: the View from Both Sides," are summarized below.

Check out Erik Snapp's full "Applying for a faculty position" eBook here

1. Have a competitive CV

You don't necessarily need a Nature/Cell/Science paper. You do need multiple first/corresponding author publications in quality journals. It helps to come from the lab of a well-known investigator. If you only have middle author papers or no papers, it's unlikely you'll get a job. The currency of scientific success is publications and grants.

2. Write succinct and easy to understand documents

A common misconception is that search committee members are experts in your field. Not true. Even if you are applying to a department in your specialty area, it's a safe bet that at least some committee members will NOT be in your area. Therefore, documents need to minimize jargon. Equally importantly, you really are selling yourself. A sales pitch that requires reading two pages or even a paragraph to get to the punch line is a terrible sales pitch. State in the first sentence or two what your research is about and what you think you can accomplish.

No matter how many times I say this, candidates regularly try to convince me that their search committee is different and needs to be told all of the nuances of the research in as technical of language as possible. Seriously. My suggested litmus test is whether your friend in a lab outside of your department can understand your cover letter and research statement. My personal litmus test was whether my wife could explain what I was proposing. The result of my test was humbling. My conviction that I had a flair for communication was rapidly dispelled. She would ask me, "Is this what you mean? Are you trying to say this?" I'd say, "No, I'm trying to say X." She would then look at me quizzically and ask why I didn't just say that? Bottom line is to appreciate that your audience needs to understand your proposal to give you proper consideration.

3. Present an easy to follow seminar

See item 2. Attendees will include grad students (that are solicited for feedback), possibly the Dean, and even some people in your field that still need to understand your specific questions and experiments. Nobody EVER

Tips for getting a faculty position (CONT'D)

complains that a seminar was too easy to understand. Make your seminar accessible. Let the experts ask you about the details and then you can display your deep knowledge of your experiments and field. It's much more impressive to answer an expert's question than to leave everyone confused about your research because you waded too deep into the weeds.

4. The chalk talk, simple in principle

The first question I usually get about chalk talks is, what is a Chalk Talk? It is a 60-90 min session with department members to discuss your research plans for the next 5-10 years. You will discuss the focus of your first grant, how you will overcome certain obstacles, alternative approaches, potential collaborations, critiques of your postdoctoral research, etc. The second question is whether there is chalk. Sometimes. It can also be a Powerpoint, markers, etc. Chalk or markers force people to be more succinct. Powerpoint leads to the opposite and can suffocate an exciting idea in a swamp of unnecessary details. You DO NOT need to present a detailed review of your field or the finer points of your techniques. You DO need to be prepared to know the literature of your field and all of the caveats and alternatives for an approach, if asked. The key to a chalk talk is to effectively convey your message.

Key Things to Think about When Developing your Chalk Talk

These items should be part of the beginning of your chalk talk. These should be plainly stated. I would not recommend putting these into slide format. You want people to focus on you and your ideas. Slides will be distracting.

- What is the big question? This should be something that anyone could relate to, that people would agree is important to understand. (1-2 sentences). For example:

  Distinguishing correctly folded and misfolded proteins is essential for human health. Failure to do so is implicated in several human diseases.

  Proper patterning of cells and tissues is fundamental to development. I'm interested in how cells find their way to the correct positions.

- What is the knowledge gap in the field? How will your approach resolve this problem? (2-3 sentences)

- What will be the focus of your first grant? (1-2 sentences)

Tips for getting a faculty position (CONT'D)

- Simply stated, what are your aims? You could directly state your official aims, but I suggest distilling them into simple goals/outcomes. This isn't the time to go into detail.

- Finally, state how successfully completing the research will advance the field, create a new field, impact disease treatment, etc., again in clear terms. "Implications for human disease" is vague. Instead, consider "A mechanistic understanding of this system will provide the first defined model system that we can manipulate to study pathology and therapies."

This is only the first few minutes of the chalk talk. Realize that it is rare to make it through the details of all of the aims of a chalk talk. Questions take a lot of time to discuss and the questions are important. However, it's much easier to focus on the questions when you're secure in the knowledge that you have given everyone a simple plain language map of where you are going and what you expect. For the rest of the chalk talk, as with your job talk, avoid the temptation to provide too many details. Reverse engineer your talk. Identify the key points you want to convey for each section or aim. Make sure those get priority. The fine details for aficionados should be reserved for questions.

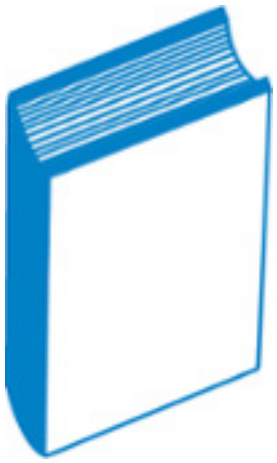
5. Understand the job you are applying for

It's not about you and how you will finally be granted the faculty position you have craved since grad school. It's about how YOU will fit into a department and bring in grants. What kind of colleague will you be? Do you understand what it takes to be successful in running a lab, getting grants, and writing papers? This means that once you get an interview, your previous success will not necessarily translate into getting a job. Your papers and pedigree get your foot in the door. Your ability to interview and sell a vision for your contribution to a Department's/Institution's success is the task.

Do your homework. Learn what your future potential colleagues study. Think about how you might collaborate or, at the absolute minimum, can appreciate their research. Be prepared to discuss other people's research. Nothing turns off an interviewer faster than when a candidate says "I'm not an expert in [your research area]," – you should show interest in other faculty members' research.

Get more tips from the full eBook

Of course there's more to the job search and interview process – these are just my top takeaways. My full eBook (available here for free!) contains strategies, hints, anecdotes, and insights. After I wrote the first version of my manual, I added new chapters to incorporate the experiences of the people that provided me with feedback from their own job searches. I've updated chapters to reflect new technologies, i.e. video interviews. For point of reference, I submitted my applications all by snail mail and only had phone interviews. We didn't have Skype in 2004. I also incorporated example documents. This part has generated a lot of positive feedback. Many of these documents are too vaguely described in other sources of guidance or the document examples are not especially helpful. I set out to make something practical and accessible. If there's something you come across that is not covered, please email me and I'll try to answer your question and subsequently update the ebook.



Tips for getting a faculty position (CONT'D)

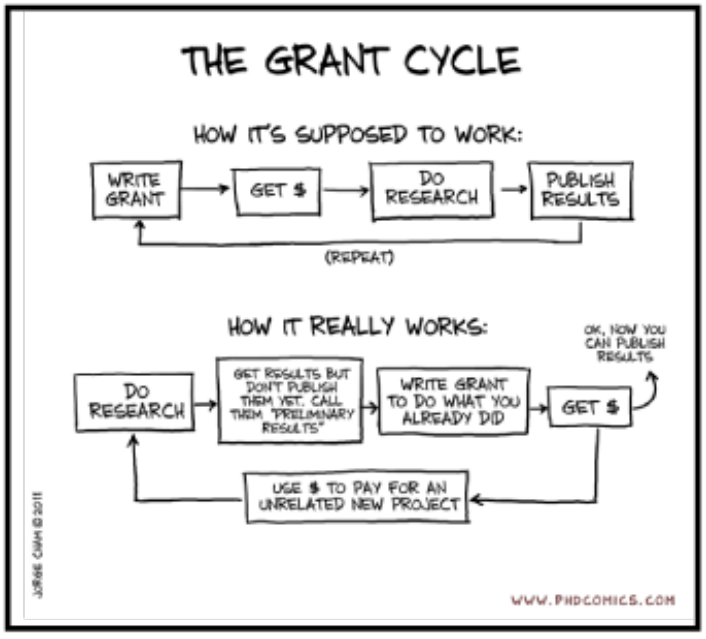
One of my graduate students encouraged me to publish this manual and earn some cash for my expensive habits of running shoes and single malt whiskies, but I remember the days of modest postdoc salaries all too well. If there's a group to make money from, postdocs are not that group. If you read my ebook and it helps you, please introduce yourself to me by email or in person. If you feel compelled to repay me in some way, I encourage you to help your friends and colleagues with their job searches. If you feel the urge to repay me personally, I will gratefully accept a very hoppy pint of IPA or a few drams of single malt (preferably from Islay or Skye).

Good luck with your search!

5 steps to writing grant proposals for grad students

By Margo R. Monroe | February 11, 2014

Research at universities typically requires funding from a variety of government and academic institutions. New graduate students may assume that their advisor alone applies for these competitive grant applications; however, in some cases, your advisor may choose to allot some if not all grant duties to trusted students. For example, if the proposal call aligns with your work, your advisor may want to mentor you during the grant application process. When my PhD advisor first asked me to write a grant application due the following week, I felt overwhelmed. Jumbled thoughts such as "I have no idea how to write a grant!", "I don't have time for this if he wants data by next week!", and "This is his job!" filled my naive mind. Moving forward from that first experience, I learned the details of grant writing, volunteered to take the lead on various applications throughout my graduate career, and helped receive funding towards my PhD project.



"Piled Higher and Deeper" by Jorge Cham
www.phdcomics.com

Grant writing offers various skill building opportunities that graduate students and postdocs should actively pursue.

Proposal writing:

- Improves technical writing and communication skills,
- Elucidates the big picture and future directions of the project,
- Outlines a detailed scope of specific aims, milestones, possible setbacks, and potential alternative routes,
- Provides opportunities to convince others why a project is the best approach to a given problem,
- Empowers the writer,
- And offers insight into a career as a Professor.

Step 1: Your PI forwards you a request for applications (RFA)

First, check the submission deadline and try not to panic if it's due in a few days, weeks, or months. It is always helpful to remember that if a PI asks for assistance in the grant application process, she has faith in you! Additionally, keep in mind that universities require application submission in-house approximately 2 weeks before the RFA due date in order for the administrative side of the grant to be established.

Take time to read and fully understand the RFA. The RFA contains all of the important information required for a successful grant application. It typically includes overview information, key dates, funding description, research plan, award information, eligibility information, submission information, selection criteria, and award administration information. Carefully read over all parts until all aspects are understood. While reading

5 steps to writing grant proposals for grad students (CONT'D)

the funding description, pay attention to the keywords used and think of ways to relate the proposal and deliverables to the aims requested in the call.

Step 2: Develop a research plan

Most grant applications restrict the space available to describe the proposed work. Thus, every single sentence and figure must be clear, concise, meaningful, and supportive of the mission of the application and the funding institution. Moreover, avoidance of 'to be' verbs creates strong, well-directed meaning and delivers strength to the sentence. Below are the typical sections in a NIH RFA, for example, and tips to consider while writing each section.

Research Challenge

The Research Challenge motivates the request for application and offers an opportunity to summarize the limitations of current state of the art technologies. Therefore, take time to review the literature and offer educated insight into what the desirable features of future technologies should offer in order to build upon and address some, if not all, of the limitations of current methodologies. This section sets the stage for why your funded proposal will address these limitations and lead to new milestones in the field.

Research Strategy

The Research Strategy highlights i) the significance and innovation of the project and ii) how you, the expert, will address the research challenge. Now is the time to make bold statements. While some of the statements may be slightly far reaching, remember that you are writing a proposal to test hypotheses and develop novel technologies! If data from a publication or preliminary data suggests the feasibility of the statement, use it to confirm that your solution is the best approach to the research challenge. Demonstrating expertise in the field and past successes boost chances in receiving funding. Convince the readers why and how your innovation will address a variety of challenges and impact the field - it's encouraged to dream big!

It is crucial that the goal and the impact of the project are clearly stated and align with the description of the RFA and funding institution. Emphasizing how your solution fits into the mission of the agency and benefits the field reminds the reviewer why your project is the project to fund. Using bold, italic, or underline font formats helps these statements stand out from the rest of the text.

Specific Aims

The Specific Aims section highlights each milestone that must be met in order to deem your proposal successful. Typical proposals consist of 3 to 5 aims, with secondary milestones to meet along the way to achieving each aim. A funded proposal typically lists the deliverables, explains 1-2 potential pitfalls of the intended protocol, and offers alternative solutions to demonstrate thorough thought planning on the matter. The more detail (within the page limits) provided in this section will convince the reviewers that the proposal is strong, well-thought out, and will be successful when funded.

Budget

5 steps to writing grant proposals for grad students (CONT'D)

The Budget gives the writer a chance to delegate funds to supplies, personnel, equipment, travel, etc. As a first time budget writer, you may find this section challenging because it's hard to determine the exact value of costs. It is important to be aware of supply costs per year, how many graduate students and postdocs will be hired, direct and indirect costs, etc. It may be helpful to ask your advisor to supply a budget form used in a previously funded grant application to see how funds were allocated.

Step 3: Get feedback from your peers and advisors

Once a rough draft is in presentable form, set up a meeting with your advisor to go over format, syntax, and delivery. Grant applications have a standard "Our work will empower the world" tone that differs from publication writing and may be challenging to master at first. Additionally, reach out to peers and collaborators who have succeeded at grant writing to see what tips they found useful.

Step 4: Read and learn from the reviewers

Reviewers may take 6-12 months to give feedback on the application. Make sure to invest time and consider the reviewer's comments. Whether the proposal is funded or not, the comments help gauge room for improvement, deliver outsider opinions, and reveal items to include for the next application. Although some comments may make it clear that the reviewer misunderstood the point that was being made, take it as an opportunity to make clearer statements on the next round of applications.

Step 5: Keep writing!

Each written grant application builds upon the last submission. Thus, continuing to apply for funding improves the associated skill sets. Increased experience in communicating and motivating research will help you understand the process and continue to improve your grant writing skills. Good luck!

Further advice on grant writing

Since succesful grant writing comes with continual practice and exposure, here are some additional links that offer more advice on writing a grant proposal.

- "Murder Most Foul: How Not to Kill a Grant Application" by Vid Mohan-Ram in Science Careers
- "Beginnings - How to write your first grant proposal" by Soapbox Science Editor in Nature Blogs
- "Write Your Application" by the NIH

Still want more information on the application process? What types of writing feedback do you find most helpful? Have a great grant writing tip? Share it with us!

6 tips for grant writing

By Sean Mac Fhearraigh | Oct 18, 2016

No matter what facet of academia you are in, grant writing can be the lynch pin that results in your success or failure and demands attention, practice, and honing of your skills from the start. Just like with any sport, hours of practice are required and no one lab or professor becomes an overnight success. Below I have detailed some tips to improve your grant writing and hopefully increase your success rate.

1. Submit your grant early!

First off, and perhaps the most important bit of advice I can suggest, is to give yourself plenty of time when writing a fellowship proposal. Yes, yes, I hear you saying "We know this already!" But, you do need to be able to research and write your application, then give it to someone else to read and / or give yourself a bit of a break before you read over it again with fresh eyes and correct it (and, believe me, you will need to correct it). It's easy for reviewers to spot when an application is rushed (whether the idea isn't properly researched / developed or the application is full of typos) and these are unlikely to get past the initial round of screening. I STRONGLY recommend that you ask a PI or mentor (your supervisor/ a previous supervisor / someone else in the department) to read over your application and give you feedback. They've most likely been through the process themselves many times and will have useful advice about what reviewers in your area are looking for. Remember though, you need to leave them time to read it, give it back to you, and for you to make the relevant alterations before submitting - handing them your application 3 days before the deadline isn't going to be much use.

2. Originality is essential for grant success

The two most important things reviewers will be looking for in your research proposal are originality and relevance. When reading through your proposal, ask yourself: is it clear how novel my findings will be and why these findings will be worth knowing? This can sometimes be tricky, as most of our research builds on ideas and findings from our own or other groups, but your work must be original (otherwise why would you be interested in it?) so make sure that comes across. Check out some in-depth grant writing tips at the Human Frontier Science Program's website.

One way to add originality to your work is to collaborate with specialists in different fields that can provide different insight into an area - not just working within the established network of your peers. Furthermore, using new technologies to solve a problem can allow you to approach that problem in a novel way. Finally, engineering new applications to solve problems will provide originality to your work and possibly a new perspective on the field.

3. Highlight your network and your collaborators

It's a good idea to move around to different labs during your career; you learn new techniques and interact with new people. If you are looking to move to a different university, perhaps in a different country, choose where

6 tips for grant writing (CONT'D)

you go carefully. Funding agencies want value for their money so you need to make it clear that you will be doing your research in a group or facility that is a world leader in your chosen area of research (either because of expertise, equipment, or excellence of the institution). Likewise, if you're staying in the same lab where you have been working for the last few years, you need to be very clear that you are staying because it is the best place in the world for your research to rapidly progress.

4. Become a science communicator

More and more fellowship applications are asking for a 200-300 word explanation of your research for non-scientists. Most fellowships are funded by the general public (either through taxes or charitable donations) so there is an increasing realization that, if we want people to keep contributing to science, it would be helpful for them to know what we are doing and why. I always ask kindly friends and family to read my non-expert paragraph and point out words or sentences that are unclear. We're so used to conversing with other scientists that we forget that some of the terminology we use routinely isn't common to non-scientists and may make your perfectly reasonable paragraph unintelligible to a lay audience.

My lay paragraph typically includes a couple of sentences of introduction to my area, a line about the research I will be doing, and a line about what I hope to discover. This section may make the difference in whether you get funding or not; applications for funding from charities, commercial organisations, or universities may have someone senior from accounts or HR on the judging panel. It's important for this person to get a clear and concise explanation as to why they should give you money.

5. Practice makes perfect, apply for small grants too

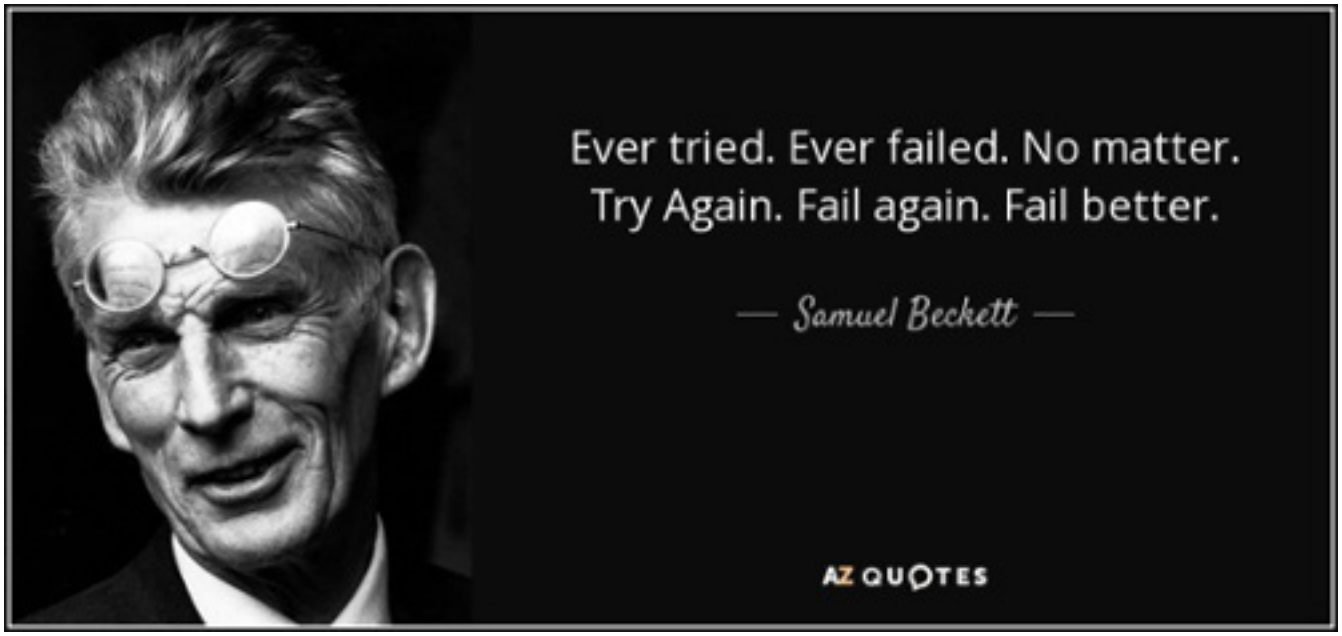
There are actually quite a lot of different pots of money available for researchers, so look into applying for smaller grants from within your institute or a private funding body. Success breeds success and I have certainly found that the experience I gained in writing small travel grants to attend conferences and a seed funding grant for a proof-of-principal study were very helpful in assisting me with applications for much larger fellowships. Also, if you were awarded money to carry out research, be sure to make it clear what the outcome of the work was. Ideally this would be results published in a paper, but postive outcomes can include poster presetnations, talks about your work, or even the successful use of your preliminary data to secure further funding. Make it clear that you intend to be productive with the granting agency's investment.

6. Failure is part of the process, keep your head up!

It's very likely that at first (and second) you won't succeed, but you must try, try again. Now, this does not mean that you should apply for everything that's out there, it just means that you shouldn't give up when your applications get rejected on some occasions. Strategize, choose calls that suit your career stage / research area, and focus on producing a good quality application. Even following this advice, only about 50% of my grant applications have been successful. Looking back at my successful applications, I can't always find something that made them better than my unsuccessful ones. With grant applications there's going to be an element of luck involved so it's important not to throw in the towel if 1 or 2 funding bodies say no. If possible, get feedback from the funding body through their scoring system or meeting with their grant submission panel. Some funding bodies provide opportunities to attend an overview of what they are looking for in grant submissions and will

6 tips for grant writing (CONT'D)

direct you on how to submit your work either through seminars or webinars. Sending out your grant application to your peers and collaborators can also help you get some critical insight into what you're doing wrong. All this helps to improve your application for the next grant cycle.



6 Tips for grant writing (CONT'D)

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Resume writing for non-academic science careers

By Theresa Liao | December 18, 2014

When transitioning from an academic science career path to a non-academic one, one of the biggest changes (and perhaps challenges) is the need to present yourself using a resume. Indeed, instead of having all the pages in a Curricula Vitae to showcase your publications, academic performances, and research experiences, you now have merely two pages to convince your potential employer that you are the right candidate for the job.

How can you incorporate the skills developed during graduate school into your resume? How can you stand out among all the candidates applying for the position?

Here are a few things to consider when you're preparing your resume for a non-academic position:

What is a resume? How is it different from a CV?

Get familiar with the general format of a resume and the different presentation styles. Wikipedia does a good job summarizing what a resume should be about. With a CV, information is usually presented chronologically. With a resume however, most often people choose a reversed chronological style (the latest to the earliest) or a functional one. Pick one that makes sense for your skills, and the job you are applying for. Also remember that a resume is typically no more than 2 pages long.

Write Your Resume for the Job Posting

Don't think a resume is "one size fits all" like sometimes CVs are. Because you only have two pages, you need to have a good idea of what should be highlighted on your resume, and tailor the resume for the job posting. For example, if the job asks for experience in "statistical analysis", mention "statistical analysis" (word by word) in your resume. If the job posting says "French-speaking is an asset," mention "speaks French." Employers usually don't spend more than 20-30 seconds on a resume when they first look at it. Don't make them have to guess what you are capable of. You would be surprised to learn how often I see resumes from good candidates that I almost missed because I had to "dig" hard for the information.

Think "skills," not just "research and publications"

What are the skills you developed through your research? Don't simply write about the research you did. Emphasize the skills. If you studied astronomy or bioinformatics data, then there is a chane that you have handled large data sets and are familiar with statistical analysis. If you have done fluorescent imaging, then you probably have experience using image analysis software. If you use computer programs to predict protein structures, then you might know a thing or two about computer modeling. Make sure to focus on these skills. The only exception is when your research topic is closely related to the job you are applying for, in which case talk about your research, as an understanding of the topic will give you some advantage over other candidates.

Write About Your Transferable Skills

Some of the skills you developed might not have come from the research itself, but from what was necessary in order for you to do your research. For example, did you help put together a grant application? Are you familiar with the publishing or patent application processes? How about facilitating a collaboration between research groups? Perhaps you had some supervisory experience working with undergraduate students? On top of that,

Resume writing for non-academic science careers (CONT'D)

perhaps you were involved in some extracurricular activities – did you volunteer to do science outreach and teach children about science? Or perhaps you have presented in some public lectures? These transferable skills could be meaningful for your potential employer. For example, my experience in science outreach and writing was how I got my current job as a Communications Coordinator.

Wondering how you can develop more transferable skills? See Developing Transferable Skills During Science Training and So You Think You have Skills.

Talk to your career services office

Most universities actually have career services offices. You might think only undergraduates use these services, but some of the general knowledge about preparing a good resume, writing a concise cover letter, and dealing with interviews, is actually universal. Some universities even have officers working specifically to assist graduate students in job searching.

Start early, start now

Don't wait until the day you defend to start thinking about your next step. Start thinking now. Start browsing job postings and look at the jobs you are interested in. Consider listing the skills you already have, and the skills you need and don't have yet for that dream job. Also, many universities make their job postings and salary expectations public, so start by looking at these university postings to give yourself a sense of what to expect.

If you are still debating whether to stay in academia or not, it is even more important to start early. Think about your plan for the next 5 years. Does an academic career work well with your life and career plan? This might be a tough question to ask now, but the earlier you ask yourself, the better prepared you are for your next step.

Here are some great resources to get your resume started now. Good luck!

- Resume 101 from University of British Columbia, Student Services - includes videos on general resume writing, as well as additional videos with emphasis for graduate student resumes
- UC Irvine Non Academic Job Search Handbook & Resumes
- Outside Academia: Finding a Job in Industry, Business, or Non-Profits (Brown University Career Lab)
- Read the sedction on Submitting a Resume That Gets Seen

6 steps to submitting a resume that gets seen

By Joanne Kamens | July 9, 2015

Expanding your network of relationships early and often is the most effective tactic a scientist in training can adopt to ensure opportunities in the future. Studies show that the majority of job offers arise as a result of existing professional (and personal) relationships. However, most job seekers will and should apply for jobs posted online as one part of their job search. This is especially true of scientists seeking a first job after the academic bench. Utilizing existing relationships as part of the job application process can dramatically increase the chances of being seriously considered for an open position.

Here are 6 steps to submitting a resume that will give you a chance at an interview:

1) Have an excellent resume ready to be submitted

The structure and content of a resume can be crucial for a successful application. It takes time to prepare an excellent resume...it is worth it. Read here to get help if you are having trouble preparing your most excellent resume.

2) Follow job boards and check them regularly

Use your research skills to determine which job boards list positions interesting to you. Many job postings will result in hundreds of applicants the day they are posted. If your resume is not in the first pile, it may never even be reviewed regardless of personal connections to the hiring group. Read here for more on timely submission of a job application.

3) Read job descriptions carefully

Be open minded and be bold. You don't have to have all of the listed qualifications to apply for a position. A job description is usually a wish list and the hiring manager knows that no applicant is likely to meet all the criteria. Note the criteria that you meet strongly and note the ones that you could meet with learning (scientists are trained to be good at learning new things—this is a strength you can draw on and demonstrate in your application). Beware the myths of scientist "overqualification" but it may not be productive to apply for jobs that require a bachelor's degree if you have a PhD.

4) Customize cover letters and even resumes

The cover letter must address how you are qualified and why you are interested specifically in the position. We frequently receive clearly generic cover letters that expound on bench skills and experience. Most Addgene PhD level job descriptions clearly describe that the roles do not involve bench research. I am always surprised at how many applicants ignore this in their cover letters. It is also important to express interest, even excitement, in a position. Everyone prefers to hire someone that will be excited to be there. If you are appying for diffrent types

6 steps to submitting a resume that gets seen (CONT'D)

of positions (for example, bench research vs. project managment) your resume should also be customized to highlight different skills and to get the important information in the right place on the page.

5) Apply for the job as requested in the posting

Do this online and/or via email exactly as the job posting instructs even if you have a networking connection that will be helping (see below). Your resume must be in the official "system" for hiring managers to take next steps and follow up especially in large companies. It is fine to address the cover letter "To Whom it May Concern" as you will not likely know the exact person monitoring submissions (usually a Human Resources representative). Pro tip: if there is no place to upload a cover letter, make your cover letter the first page of your resume pdf document.

6) Use your network!

During the entire process, use whatever means you can to get your resume into the hands of the hiring manager on paper or as an email sent directly from a mutual connection. If the organization is small, any person at the company might be able to help you. If the organization is large, you will need to be more directed and target someone in a specific department and/or location. The more people you meet the better chance you have of finding a beneficial connection. LinkedIn is one great way to find an appropriate liaison, but you can use alumni databases, friends, and even relatives to network your way to a hiring manager.

Learn to confidently describe your strengths in your resume and don't be shy about asking for help. The worst thing that can happen is someone will say no, but if you don't ask, you will never get the help that can make a difference. Having your resume forwarded personally gives you a much better chance at an interview –but you still need to nail the job yourself.

Finding your perfect job after university

By Emma Markham | January 12, 2016

Being a scientist in my late 20's, new graduates often ask me for advice on careers available to new science graduates and the pro's and con's of working in different sectors. Luckily, I have worked for a variety of different organisations, so I tend to provide them with an overview of my experience and how I felt about the different positions to enable them to decide for themselves. Here is my experience looking for the perfect job.

Summer work experience in cancer research

After graduating with a 2:1 BSc in Molecular Biology (roughly a B average in the American system), in 2009 (at the beginning of the financial recession) I knew obtaining work in scientific research would be very competitive, and so I applied for a summer role as a Research Scientist at the Institute of Cancer Research in Sutton, located on the edge of London to gain relevant experience. I applied for this summer position as I felt I needed more practical lab experience to later gain a full time position in a lab. I worked on the genetics of Wilms Tumour, which is a type of pediatric kidney cancer. This was particularly interesting as I had just completed my thesis on the study of e2Fb, which is a tumour suppressor. This summer role was incredibly valuable because it was a set duration of only three months and made a good job to list on my CV. Three months was a perfect duration for me because it was sufficient to figure out if my image of lab work lived up to reality, and, if it is wasn't a good fit for me, then I didn't need to explain why I changed jobs. I highly recommend taking on a similar position in your field of interest before you dive straight into a full-time position. For my part, I really enjoyed some aspects of the work, such as physically carrying out experiments like PCR and running gels, but in research you also experience a lot of failure and problem solving. I believe that is something lacking during degree courses; they never really prepare you for the amount of failure and problem solving scientists experience during research.

10 Tips for New Graduates

1. Obtain experience early, this will set you apart and show that you are motivated and driven.
2. If you have any interest in programming, then take some courses - this will open many doors.
3. Be willing to travel and work abroad to get the role that's right for you.
4. Figure out the "Buzz words" for your dream job and use them effectively in your CV.
5. Don't worry about leaving a job after 6 months or a year if it isn't right for you. In today's society, there isn't really a job for life and companies are understanding that new graduates are still trying to figure out exactly what type of job they're looking for.
6. Explore different sectors and be open to roles you might not have considered before.
7. Be willing to make compromises.
8. Remember that looking for a job is not just about what you can do for the company, but also what they can offer you. Ask about the ability to advance and work your way up, and find out if you can bring your other skills and interests into your work.
9. Look for the right work-life balance for you. Do some research and ask if you are required to do overtime or work weekends.
10. Consider a Student Visa or Working Holiday VISA to gain experience working or studying abroad. This helps you build an international side to your career, gain valuable skills, and save money. Studying a degree in many countries is also tuition free.

Working abroad in rural Africa

Once this position ended, I wanted to explore another area which I was really passionate about during my degree. I loved parasitology. However, when I enquired about roles in this field, most jobs needed at least 3 months experience working in a developing tropical country. This is why I set up a placement working in a rural health clinic in Ghana. My role involved teaching the nursing students and community health workers some basic

Finding your perfect job after university (CONT'D)

biology and first aid. This really allowed me to see the practicalities of working in the field with the most basic equipment and was a tremendously positive experience. I enjoyed helping people and learning to explain concepts in ways that people from another background or culture could understand. I did, however, find it very hard to speak with individuals who had very strong beliefs in traditional medicine, especially when I knew that there was a cheap and easy treatment for a disease that traditional medicine couldn't fight effectively. I had to learn how to cope with a different climate and culture, and also needed to be resourceful and adapt. By the end of my three months, I fully understood why parasitology roles in the field require experience.

Working in industry - microbiology

On returning from Ghana at the beginning of 2010, I explored options for going into parasitology but another major factor held me back; I do not know a second language. During the recession there were many qualified scientists with experience and a second language in Spanish or French, and so they were ideal candidates for these positions. I had to reassess what I wanted to do and so I applied for a role in Industry. I wanted to get "a real job" and roles in Industry do tend to pay better.

I worked in a Microbiology testing facility, where I tested materials for bacterial contamination. It was a really interesting job at first, everything was very new, and everything was more structured and controlled. I worked from Standard Operating Procedures (SOP's) and every item I tested was constantly tracked with barcodes and spreadsheets. It was great to be in the lab doing experiments without the constant fear of failure because I knew the tests worked and would produce a reliable result. This is not to say the role was without issues. Because the primary purpose of the company was to fulfill contracts, my work sometimes felt rushed and the focus always seemed more on getting results than doing good science. Another problem was that the work became monotonous very quickly; as soon as I learned how to do the different tests and became efficient, I then started to become bored because I was not being mentally challenged. For these and other reasons, I started looking for other career options after 6 months.

Returning to university for a masters of science

I decided to apply to study a Master of Science (MSc) in Human Molecular Genetics to give me an edge over other graduates during the recession. As each advertised job received many applications, employers were requesting that only scientists with an MSc or higher apply. It was important to weigh the cost to benefit of studying a Masters, because tuition fees had just gone up dramatically and, in England, you could not receive government loans to study a MSc, so I had to take out a personal bank loan. I saved money from my role in Industry and took evening work to help cover the costs. My MSc courses were interesting and luckily genetics was a rapidly growing sector. These factors left me optimistic that I would find a genetics related role soon

Finding your perfect job after university (CONT'D)

after finishing my MSc. The masters program was 6 months of classes and 6 months of hands-on lab work for a dissertation. I chose to carry out my dissertation research in a lab in California. I felt then, and still feel now, that it is important to take advantage of the fact that science is a global language that allows you to work anywhere and build a network around the world. The research project was hard; I was researching the epidemiology of breast cancer and I loved the practical aspects of testing samples in the lab, but I really struggled with the large scale data analysis, as this is increasingly reliant on programming skills which are not my strong point.

Working in industry - virology

On completing my MSc, I again had to look at what type of work I would like to do. I had taken advanced virology classes in California and enjoyed them, so I applied for a role at a commercial virology testing company. This particular company carries out clinical trials of drugs and treatments for external companies. It was really exciting to work in a larger commercial company; the pay was good and there was a variety of work. The work was very scheduled and it was really nice to have my day planned out. This allowed for a better work-life balance compared to working in research. My previous experience working in Industry was really valuable; I had received all the training and experience relating to good manufacturing practice (GMP) and good lab practice (GLP) (important buzzwords in industry) as well as skills in industry positions.

There were, however, some downsides to working in a large commercial company. In my particular situation, communication between departments was sometimes difficult and the solution attempted was more meetings, but this simply seemed to create more bureaucracy. As with any large company (both for-profit and non-profit) you can also get a lot of office politics (many individuals trying to divert more resources towards their projects and away from other individuals projects, this can cause conflicts and favoritism, as well as affect morale and cause gossip). These kinds of problems can, of course, be solved with good management practices, but can sometimes go unnoticed at large organizations. Another downside to large commercial companies which are reliant on contracts with clients is that, when those contracts fall through or are cancelled, then redundancies can be made within the company; new staff hired in anticipation of the contract suddenly have less work to do than was anticipated and there can be a glut of individuals with similar skill sets. This is not to say that all commercial companies are like this, as most have a more stable funding situation and level of work than research or academia, and so most positions in industry are more stable than this. However, I would advise you to be wary of companies which are rapidly expanding, as this might not be sustainable. After working at this company for several years, I was ready for a change.

Finding your perfect job after university (CONT'D)

Working abroad - research in Australia

I then travelled abroad to work at the University of Queensland in Australia, this was a perfect opportunity to work in a genetics lab. As a UK citizen, I was entitled to a Work-Travel VISA, which means I can gain employment for up to 6 months in Australia or another country of the Commonwealth. Another reason why I chose Australia was because it is an English speaking country with a strong economy and plenty of jobs in science at world renowned institutes. The lab at the University of Queensland required a scientist for a 6 month project to validate some genomic changes, so this arrangement was ideal for everyone. The cutting edge science in this lab was amazing. I loved working on developing an easy to use diagnostic tool for the detection and diagnosis of different types of pancreatic cancer and highlighting which treatment would produce the best outcome for a specific combination of genetic mutations. This is a particular challenge in pancreatic cancer where one drug does not work for all patients, leading to very high mortality. I really loved the fact that my work had a real impact people's lives and would improve their treatment outcomes. I would say that the only downside of modern genetics from the perspective of somebody trying to get hands-on lab experience is that the technology is so advanced that most of the procedures in the lab are done with robots. Young scientists going into this field don't really get to do a lot of lab work but instead really need to be comfortable with programming.

Working for a scientific not for profit

On returning to the UK, I checked out the job postings from recruitment agencies and noticed a position available at a small science non-profit doing customer service (recruitment agencies often don't tell you what

Finding your perfect job after university (CONT'D)

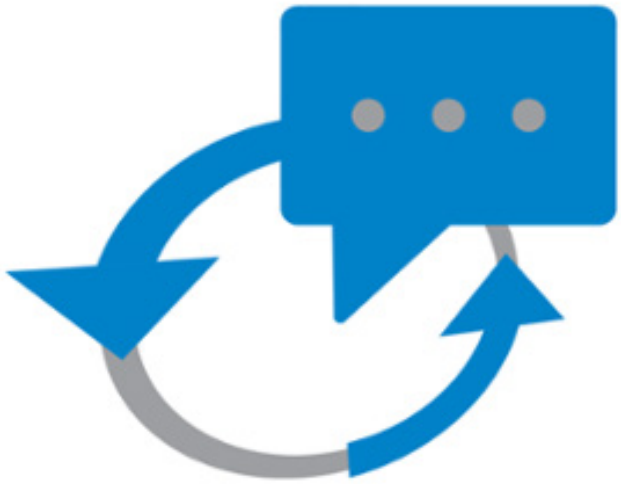
company a job is with until just before the interview). This wasn't exactly my idea of a dream job, but I knew that I enjoy helping people and decided to compromise and applied anyway. I later found out the job was with Addgene. I had used plasmids from this company before and recognised the logo, but didn't know much else. During the interviews, I asked if I could contribute more towards the scientific aspects of the company as well and use my other skills and interests. I was so glad when my future supervisors were keen for me to become involved with many different aspects of the company and gave me the freedom to design new projects and grow in the role. I understand this is a fairly unique situation, because it is a small and dynamic company and so it has the flexibility of a 'start-up'. I was surprised how well I fit in with the company and that my ideas and changes were welcomed, which is a benefit over larger companies which have more bureaucracy and cannot be as adaptive.

I was also surprised to learn that I enjoy the customer service side of my job. Because of my background in genetics, I can help scientists problem solve experiments over the phone or explain how various plasmids work. Most people who call or email me are scientists who are grateful for some help. I also get the chance to contribute content to the Addgene's Website and travel to meet scientists, making my job different every day. I love the freedom to design and develop my own projects, but working remotely (Addgene's main offices are in Cambridge MA, while I'm based in London) does bring its own challenges. I've had to become skilled with technology like Skype in order to have meetings between teams. This communication is vital because otherwise I'd lose touch with my colleagues and have misunderstandings. Working long distance, you need to be very self-motivated, because you need to work independently most of the time and plan your own work schedule. I really love my highly varied role, it has allowed me to travel and to share my passion for science, but I also understand my job would not suit everyone.

My career path may seem quite unusual but it has allowed me to try out working in many different sectors and to discover for myself what potential job opportunities are actually like day-to-day. It is all too easy to see 'real' science as wearing a lab coat and working at the bench, but the reality is a little different. Industry and academic jobs do exist, but working in industry just wasn't for me, and as has been highlighted recently it has become more difficult to attain a permanent position in academia. It is therefore important for young scientists and PhD students to also explore a range of alternative careers outside of acidemia to have the best chance of finding their perfect job.

Science communication: 9 strategies to get your foot in the door

By Sarah Schmidt | September 17, 2017



Are you a science student or early career researcher looking to break into science communication? Everybody goes about this in their own way. The career paths into science communication are as varied as the field itself. Among other things, science communication comprises broadcasting, science writing, and certain aspects of art and education. If you suspect that science communication might be for you, don't wait. Start communicating now. These 9 strategies will get you started:

1) Twitter - get your voice out there

Here's one thing you can do today: Sign up for a Twitter account. Check out the hashtag #scicomm and start following science communication societies like @BritSciAssoc, @AAAS, @Stempra and science blogs like @WIRED Science. Don't be scared to engage with them. Comment on their activities and participate in discussions. Get your voice out there. Use Twitter to promote your other science communication activities, e.g. tweet when you publish a new blog post, and live tweet from conferences.

2) Public engagement - participate in science festivals and outerach

If you are comfortable talking in public, volunteer at science festivals. Or engage with non-scientists in an unusual setting: Discuss your latest research in a local pub at a Pint of Science event. Or get on stage for a Science Slam – a sort of competitive TED talk – to win the audience's applause with your performance. When your institute opens its doors to the public, for example at an anniversary or for Girls' Day, offer guided tours to show people where the lab magic is happening.

3) Volunteer- step into science education

Do you aim to reach young people? Try networking with your local education community. Get involved in education advocacy non-profits like Phipps Conservatory or the Brilliant Club and share your knowledge at local schools. Or work as a guide in local museums, zoos or botanical gardens. You can also work or volunteer for a science communication organisation like Building with Biology. Local environmental groups, charities and NGOs are often looking for outreach volunteers as well.

4) Blog - hone your writing skills

Take the DIY approach and start a blog. Stellar talents like Ed Yong jumpstarted their science writing career by blogging. Writing a blog is not only a great form of scientific outreach, it also helps you to hone your writing skills and make a name for yourself. Pick a topic that is close to your heart, set up a blog using a site like WordPress

Science communication: 9 strategies to get your foot in the door (CONT'D)

and start writing. Grow your audience by advertising your blog on social media and by engaging with other science bloggers.

If you don't have time to maintain your own blog, you can probably write for your institute's blog. The Wellcome Trust blog or the John Innes Student Voice are two examples. Many blogs like Plant Science today, Soapbox Science (hosted by Nature), and Addgene are open to guest contributions.

If you decide to start your own blog, check out these two excellent articles:

- On the Origin of Science Writers
- How to create a succesful science blog

5) Get creative - bring your knacks into play

Perhaps writing just isn't your cup of tea, and you are more of an audio or visual person. Why don't you record a podcast or put some effort into making a video? Use your unique talent to communicate science. You can draw live sketches at conferences like @ATJCagan or create agar art with colorful microbes? Try your hand at photography and participate in a science photo competition. Or nominate yourself as an educator for a short, animated TED-Ed lesson.

6) Network - mingle with the pros

Where do you meet like-minded science communicators? Attend the annual flagship meetings of AAAS, WCSJ or ECSJ. These meeting are THE opportunity to grow your network. Get to know and get known by editors and others whose careers are in advance of yours, but also get inspired and meet peers. Join societies like National Science Writers Association, EUSJA or ABSW for helpful tips and job offers. If you live in the UK, join the SciComm mailing list.

7) Internships - learn on the job

Nothing prepares you better than learning on the job. Try to get an internship at a magazine or newspaper (here's a partial list). A great opportunity is the AAAS Mass Media Fellowship, which places science students for 10 busy weeks at media outlets like National Public Radio, WIRED, Scientific American or National Geographic. Similarly, media fellowships from the British Science Association allow you to spend two to six weeks working at media outlets such as the Guardian, BBC Breakfast or the Londonist. BBC provides a peak into their day-to-day business with popular work experiences of 3-10 days. And the Society of Experimental Biology offers press internships to cover their annual meetings.

8) Training - get a formal education

Some people get into science communication by taking a media or journalism course. Courses can help you gain work experience and build your network, but don't expect them to be the "be-all-and-end-all". You can, for example, get an MSc Science Communication or MSc Science Media Production at Imperial College London. Similarly, the University of Cardiff offers an MSc in Science, Media and Communication. In the US, UC Santa

Science communication: 9 strategies to get your foot in the door (CONT'D)

Cruz, MIT, UW Madison, and Boston University offer science communication programs. Others, like Northwestern University or UC Berkeley have journalism graduate schools where you may take a science track.

If you don't want to commit time and money to a full-time graduate course, UWE Bristol offers an intensive 4-day Masterclass in science communication. The National Co-Ordinating Centre for Public Engagement (NCCPE) provides on-site courses in public engagement for institutions and the Royal Society gives training in media skills, writing about your research and residential communication. If science journalism is the path you want to follow, check out the distance learning courses at the National Council for the Training of Journalists (NCTJ) or the Alan Alda Center for Communicating Science. If you choose to teach yourself, check out MIT's OpenCourseware for course materials and assigments.

9) Citizen science projects

Lastly, if you'd like to directly involve the public in your research projects, you can set up a citizen science project. Answering the big science questions around climate change, biodiversity, or genomes requires lots of data. Get your community involved in sampling or bioinformatics analysis or upload your data to Zooniverse. The Natural History Museum has downloadable resources to enable you to set up your own citizen science project.

Science communication opens doors

Getting involved in science communication has been the most rewarding step I have taken in my career. The moment, I got active with it, new doors started opening up. My current job as a Marie Curie Fellow is a direct consequence of a blog that I started writing three years ago on a field trip in Indonesia. Since then, I have tried many things: photography, making videos, presenting in pubs and at science festivals. Science communication is my way of living out my creative side. My newest, exciting endeavour is starting to write a book.

Tips for writing a good cover letter

By Maria Soriano | September 27, 2016

Scientists, like many other professionals, change jobs at some point in their careers. Sometimes this is a change from one academic institution to another, while other times it is a total turn in career path. Career paths for scientists are very broad and diverse. A Scientist's education, background, and training make his/her professional profile very appealing not only for academia, but also for biotech companies, consulting and editorial firms, legal and communication offices, and many other industries. The cover letter, the first piece of an applicant's writing read by any hiring manager or recruiter, is often the first way a scientist gets a foot in the door for any one of these positions. Read on for tips on writing a great cover letter so that you'll always make a good first impression.

A good cover letter is a winning ticket to a new job

The first step in any job application is to pass the organization's cover letter/resume screening process. As several career experts and advisors point out, cover letters are getting more and more important in the job recruiting process. Lauren Nelson, a communications specialist and VP at Aesthetic Cogency says:

"A well-written cover letter is more important than an impressive résumé because it reveals your work ethic and attention to detail. It provides glimpses into your personality that a list of achievements can't".

John Little, Managing Director of Successful Resumes Australia states:

"A cover letter is as important as the resume."

David G. Jensen, a writer and speaker on career issues worldwide and founder of CareerTrax Inc says:

"Let's face it, cover letters are read and resumes are skimmed."

So if you really want to be the best candidate for a position, it is extremely important not only to prepare a good resume/CV (listing all your professional experience and achievements), but also to tailor and make your cover letter grab the recruiter's attention. In terms of recruiting, first impressions matter. The mission of a cover letter is to highlight your personality features and communication abilities that cannot be measured in the resume/CV. Unlike resumes, that differ in structure, format, and content depending if they are targeting academic or non academic positions, cover letters always follow the same principle: they have to be original and show that your skills, experience, and personality really fit what the organization is looking for in the candidate; their form is generally the same, but their content must be tailored to the specific position.

Tips for writing a good cover letter (CONT'D)

Before you start writing...

Be sure that you are not applying to random job positions. If you are looking to start a career or work in a place that will help you grow professionally, it is very, very important to take some time and mentally reflect on what you really want to do next. Knowing your desired professional trajectory will help you be more successful and keep you from getting frustrated with the process. Clearcut conditions will help to narrow the search and focus your efforts on positions that really suit you, and that are able to engage you and inspire you.

Once you have decided you want to apply for a certain job, the next important step is to do extensive research about the company (or the lab). In the case of non academic positions, this research should be directed toward learning more about the company´s mission and goals, the culture, the management structure, and the organization. In the case of an academic appointment, when applying for PhD or postdoc positions, it is important to learn about the PI (if he/she is a good mentor, if he/she tends to micromanage or, on the contrary, is very relaxed and likes when people work independently), the lab projects, the lab size and environment, the type, frequency and quality of publications, the techniques, and the lab's willingness to collaborate. When applying for a tenure track position, it is also important to learn about the needs of the department and the institution, the particular skills required, and the expectations for teaching and other university obligations.

If you really, really want the position, you should spend hours reviewing the company or lab web page, reading papers, learning about the company or university policies, etc... Luckily, you can find most of this information on the web. However, you will only have access to insider information if you talk directly with somebody that works or worked at the organization. To do so, you should set up "informational interviews" with employees at the organization. These informal meetings are extremely useful, and and can give you the key to writing an impressive cover letter.

Once all the research is done, you are ready to start crafting the cover letter. At this point you will have a good picture of the organization or lab and, consequently, a better sense of what they want in a candidate.

Parts of a cover letter

As with any other letter, a cover letter has an opening, a body, and a closing.

The opening paragraph has to catch the reader's interest. Here you must introduce yourself and your background, in a way that will make the recruiter, the PI, or the faculty committee want to keep reading about you. Here are some examples of good and bad opening paragraphs when applying for academic and non academic positions (these are only ideas, remember to start tailoring the cover letter from the beginning!!):

Dear Dr./Professor [last name],

My name is [full name]. I am a [neurobiologist, microbiologist, geneticist,...] and recently earned my PhD from the Department of [name of the department] at [name of the university]. I am contacting you because, during my thesis work on [phenomenon X], I referred to your publications several times and I deeply admire your work. I am extremely interested in your field of research and in the possibility of joining your team as a postdoctoral researcher.

Tips for writing a good cover letter (CONT'D)

Dear Sir or Madam,

I recently got my PhD in [field of study]. I am currently looking for a postdoctoral position so I thought it might be good to reach out to you.

Dear [recruiter name],

I would like you to consider my application for the [title of the position] at [name of the company/ organization]. I am a [adjective that describes you] scientist with over [number] years of experience in [field of research], and have excellent [list the most important skills for the position]. I am enthusiastic about [something that you love and is important for the job]. I believe that, with my experience and skills, I will make a great addition to your company and I am excited at the possibility to join your team.

Dear Sir or Madam,

I am about to transition from academia to industry, and would like to start working in a company like [name of the company]. I consider myself a good candidate for the position.

In both of the good (thumbs up) intros above and in later parts of the cover later, it is key to be both concise and specific; you should be highlighting what precise skills and qualities make you a good candidate for the job.

The body of the cover letter can include 1 to 3 paragraphs. Here is where you convince the reader that your professional experience and skills, together with your personal features, make you the best candidate for the position. It's a good idea to match your past experience to the specified job requirements as closely as possible. Always support skills or achievements with measurable facts and do not forget to explicitly mention how you can contribute to the growth/success of the company, lab, or department. If you are looking for a graduate or postdoctoral position, the body of the cover letter should also include your skills and accomplishments in your research field. If you are applying for a tenure track position, you should include your past research contributions, your future research plan and new ideas, plus your teaching experience. In the case of non academic positions, you should focus less on your research and more on your professional expertise, professional skills, relevant extracurricular activities, transferable skills, and accomplishments that fit the job.

The closing paragraph should again show your enthusiasm for getting the position and should point out that your expertise and specific traits make you the best candidate. You can always close the cover letter expressing your total interest and availability to have an in person interview, as well as mention you have references available upon request.

Before you send the cover letter, do not forget to review the grammar, spelling, and style. It is also highly recommended that you send your cover letter to your mentors for review. It is always helpful to have an external, objective, and sincere opinion with constructive feedback in order to improve your applications.

Tips for writing a good cover letter (CONT'D)

Quick tips for writing a good cover letter

- Always be original and personalize your cover letter. Do not copy standard or generic text or formulas. Tailor a totally different cover letter for each position.

- Everything you want to say should fit in one page, so you should be selective with your words. Avoid repeating information that is already in your resume or CV.

- If possible, identify the name of the person that is going to read the letter. This is often a recruiter or human resources head (use LinkedIn to find her/him). Avoid using generic statements like "to whom it may concern".

- Highlight your achievements but do not sound arrogant. For example, Instead of saying "I have excellent communication skills" (a common requirement for many positions), it is better to support your skills or achievements with examples and metrics. For instance, you might say "I have extensive communication experience having given more than 20 talks at conferences and taught for 5 years at [name of the university]."

- Include keywords from the job description. This is especially important to avoid being rejected by robots that screen your application looking for specific words releated to the position.

- Make it clear that you are enthusiastic about the position.

- Highlight your strengths to the point that the recruiter/committee doesn't care about your weakness.

- Be clean and professional. Always review grammar and spelling several times and remember to have someone else read your cover letter (as well as your resume and CV) before sending it.

... and now... you're ready to go! Good Luck!

Tips for writing a good cover letter (CONT'D)

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10 steps to a perfect science talk

By Joanne Kamens | August 23, 2016

Like graphing data, choosing controls, or mixing clear solutions—public speaking is skill that any scientist can learn. Any time you give a science talk, you are also giving a job talk. Even if not being interviewed, there could always be a future boss in the room, so it is a good idea to start thinking about public speaking early and often. Two of my jobs have indirectly resulted from someone seeing me speak in a non-interview setting. There are many resources on self-promotion (how hard it is for some people, especially women), visibility (how to get it, especially if introverted), and networking (how to get people to remember you). What better way to accomplish all of these things naturally than to give a dynamite presentation? To that end, let's chat about giving science talks and how to make them serve you well. The happy byproduct might just be a career opportunity.

The focus of this article will be talks for non-academic settings. Many of these guidelines will apply to any type of science presentation, but, for more detail on the job talk for an academic position, see this very good article at NatureJobs: Interviews: The All-Important Job Talk.

1. Watch other people give great talks

We are not talking about lab meeting here. Lifeless presentation of experimental results in the order they were performed does not make for a memorable presentation anywhere but in a lab meeting (maybe not there either). Think Keystone Keynote presentation or Ted Talk. You want to give the audience something to think about, argue with, or learn from. Some of the best talks I have seen by early career scientists are those in the Young Scientist Seminar Series. Watch how these speakers talk without looking at their slides or notes. Listen to their stories and narratives (see below "Tell a story") and note how they build suspense. Notice the simplicity of their slides and how the slides complement the spoken message. Learn from their level of explanation in presenting data. Finally, let me take this opportunity to recommend all the science and career talks at iBiology which hosts an amazing amount of useful, entertaining science lab, career, and policy content.

10 steps to a perfect science talk (CONT'D)

2. Tailor every talk to the occasion

Don't just plan to reuse a prepared talk unless it perfectly fits the occasion. I speak on the same topics many times, but I always seek out information about the particular audience and venue before tailoring each presentation appropriately. Find out who will be listening. Are they early, mid, or late career? Will many non-scientists be present? Always ask the hiring manager or host for topic advice. An added bonus to knowing your audience is that it can help you avoid making mistakes. I once made a joke about social science to an audience that I thought consisted of all biologists. The social scientists in the room were quite offended. I felt terrible when the host told me and wished I had been more careful.

3. Tell a story

We are biologically programmed to listen and remember better when we hear material delivered in the form of a story. Using stories is one of the best ways to make you and your presentations engaging and memorable. If you read my story above about the presentation faux pas, you are more likely to remember the point.

What makes a story? A story is a narrative connecting cause and effect. Stories can and should be very simple. The goal is to get the listeners to be thinking "What happens next?" Describe how you pushed to a solution or overcame obstacles. Take time to consider the order of your narrative. Scientists do this all the time, you just need to figure out how to make it suspenseful.

4. Start preparing your talk early - like today

Don't wait until you need to speak to start creating slides or thinking about content. Create a Google.slides or Powerpoint file right now to capture interesting key results, striking images, creative ideas, and engaging stories as you encounter or experience them. Drop content in this file over the years and a talk about your research or work will write itself when the time comes.

5. Choose interesting content

Talk about something you know a lot about and that you care about. Don't try to present topics that are unfamiliar to you because the company you are visiting works on them. Of course, if some of your work does relate, make sure to include that material, but don't force it. You can always relate to scientists by explaining how your work fits in the bigger science picture. Scientists especially like to learn new things, so rehash common knowledge as little as possible. Don't use a lot of jargon in your talk, unless you are certain that the audience will be familiar with the terms. If you feel you need to define a term, but are worried that this might sound condescending, consider explaining the term on a slide but not reading the explanation. The people that need the information will find it. Experienced speakers present useful protocols, geeky science details, products that resulted from their research, "aha" moments, and future research directions. Don't worry if your work hasn't been commercialized, just talking about the possibility is interesting.

6. Practice, practice, practice in front of a real audience

Good, even great, speaking skills can be attained by almost anyone with enough practice. I always take a poll

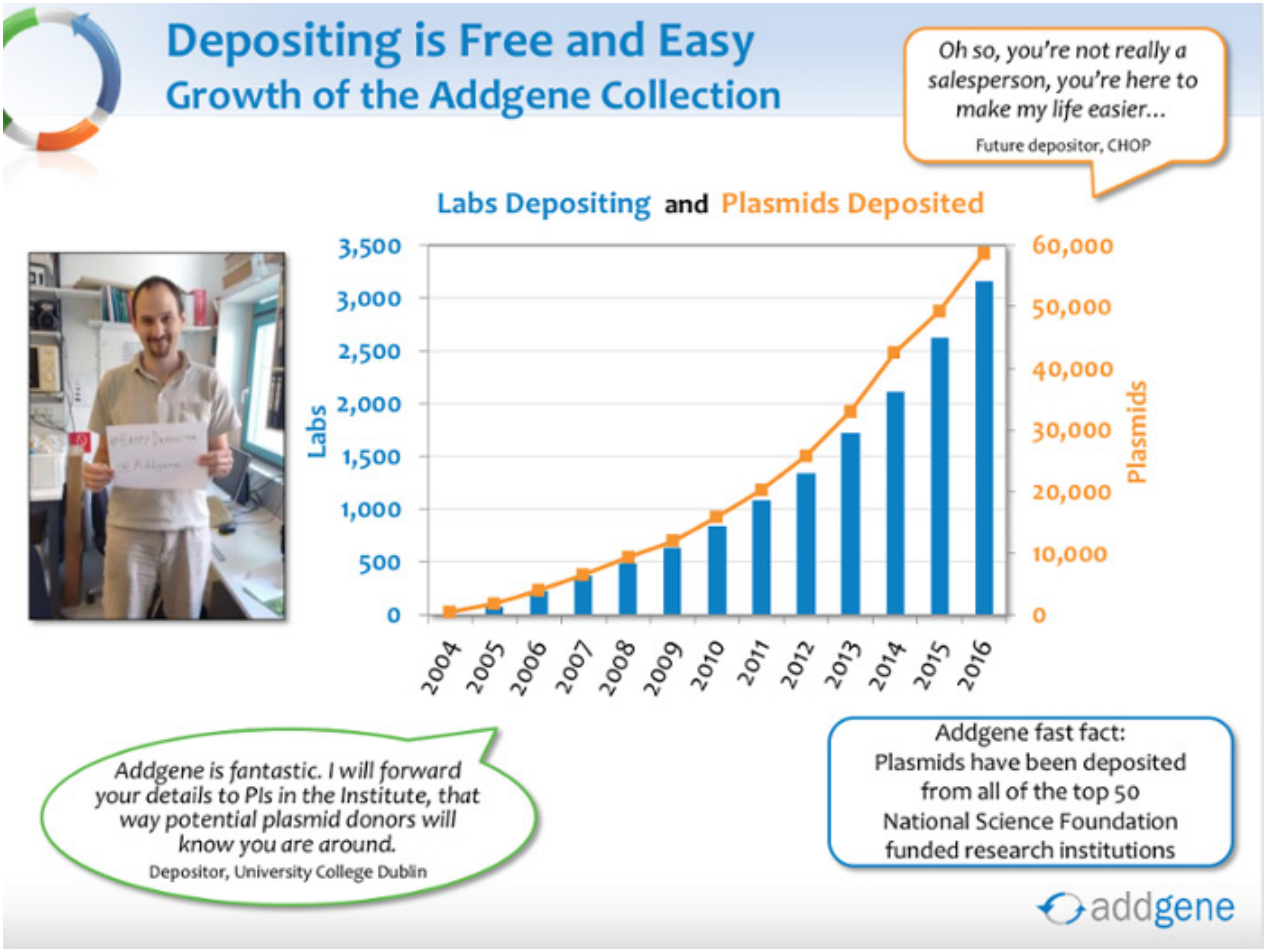
10 steps to a perfect science talk (CONT'D)

of scientists in training to see how many in my audiences have given a 50 minute talk (not a lab meeting) in the previous year. Usually fewer than 10% have done so. How can you expect to deliver a great public presentation if you are doing it for the first time? Practice talks also help a speaker determine how long the talk will really take and to adjust content and slides to better suit the target time frame.

I suggest that all graduate students and postdocs form peer mentoring groups to practice giving talks and getting feedback. Wouldn't you rather hear it from your peers than a less supportive audience?

7. Hone your slides

Use big images that are easy to see (and for heavens sakes, label all graphs and data professionally). Do remember the fine points of visual aids. Here's a great slideshare with more details on visuals in science presentations. There is just no excuse for poor quality slides with sufficient time to prepare (and it does take time). For important talks, ask your peer mentors to check your slides for typos and clarity in a big room. Finally, don't pass up opportunities to show cool visuals, but don't overdo the effects. It may be a bit unnerving to use video for a job talk, but if you can get it working well, everybody loves a great animation.



10 steps to a perfect science talk (CONT'D)

8. Predict questions, prepare answers

Speaking pros always have a few extra slides in their back pocket. During your practice rounds, encourage your listeners to ask questions and record those that were asked. Reflect on the questions and come up with clear and concise answers. This preparation will help you avoid giving only yes or no answers in front of a crowd. Having answer slides ready after your formal conclusion slide will also help with your confidence. It is best not to be asked something that you don't know the answer to, but if you are, never make up an answer. Just say you will get back to them with an answer, and do so if you can.

9. Resist the urge to say everything

I allow 1 slide for every 1 minute of talk length, and then I cut a few more slides. Do not run over your time—the audience's attention will start to wander when you are supposed to be done. They will start looking at their phones. Speaking longer just makes you seem unprepared or arrogant. A bit short is always better than too long, and ensures time for questions. Don't be tempted to cover too many things. One good topic or story is all you need, if you do it well. Resist the urge to show all or even a lot of data. I can't say this enough...more is almost never better.

10. Be enthusiastic

You don't have to emote beyond your comfort zone, but if the speaker sounds bored, the audience will be bored. You must show that you are enthusiastic about the problems you are addressing by using an energetic tone of voice. Your goal is to be conversational - the audience should feel engaged and not like they're sitting through a pre-recorded lecture. This takes practice (see above) and a deep familiarity with your content. If at all possible, practice enough so that you can deliver most of your talk without notes. Don't be hard on yourself if you stumble or make a mistake. Move on, the audience doesn't really care about these details, but does follow the general structure and flow of the entire session. I myself have a terrible habit of saying "so" and "um" a lot. I hate it when I watch myself speak, but others tell me that I keep the talk moving enough that they don't really notice.

With sufficient experience you can experiment with other ways to engage the audience. Take an informal poll by asking for a show of hands on a particular question. I like to ask about how many people use plasmids in their research and then see how many of them have requested from Addgene. It is always gratifying to see all the hands go up. It makes a great point when I then ask "and who has deposited to the repository?" When most or all of the hands go down it is a great segue to talk about how the sharing model works.

See if you can elicit helpful comments from your audience as in "Does anyone else have a good answer for this?" This doesn't detract from the speaker, but actually makes for a more engaging session. The best speakers use no notes and can concentrate on delivery, rapport with the audience, and their own excitement about the topic. Don't be fooled by thinking that fabulous speakers don't have to work at it. You have to put in some effort to be the best speaker you can be. Seek out opportunities to practice and over time you can master this important science skill.

Career coaching for scientists: Why and where do I find one?

By Joanne Kamens | January 29, 2015

Professional Career Coaching can be an excellent tactic for scientists making a career shift or who wish to improve their current job situation. What can a coach do that is different from an advisor, boss or mentor? First, professional coaches have experience and knowledge to help scientists transition out of the academic sphere into a different meaningful career in science. Supervisors in the academic infrastructure are not always as effective in mentoring for this transition. Second, a coach will help you set goals and then hold you accountable for carrying through on the actions you committed to. Finally, hiring a paid coach will make you take the experience more seriously and I have seen, without exception, that this helps people do a better job at reaching their goals.

I am a strong advocate for peer mentoring, but volunteer mentors are only able to go so far with their time and advice. A professional coach is paid to carry you through to a successful outcome and the good ones take this responsibility seriously.

As I make my rounds speaking at research institutions and at scientific conferences, I see that few scientists are aware of the benefits of coaching relationships and do not know where to look for a coach. Many (most?) graduate students and postdocs may feel they have limited funds to invest in this. However most coaches who focus on scientsits are sensitive to this and have coaching plans that are financially accessible. Sometimes only a few hours of coaching time can make an enormous difference so don't assume that this will cost a fortune for a successful outcome.

How do I find a coach?

Start with referrals. Are there scientists you know who have had a successful coaching experience? Some university career offices, postdoc offices or professional organizations can provide referrals. There are bad coaches out there, so finding a good one that is a style match for your needs can take some research.

It helps to spend some time thinking about what your goals are for the coaching relationship. Do you want to change jobs? Grow your professional presence? Learn a key new job skill? Finish your thesis? Knowing your desired outcomes will help you assess if the coach you are interviewing is the one for the job.

A professional coach will provide an initial consultation meeting or call for free. Take advantage of this to get the information you need to choose well.

- What are their qualifications? Do they have certifications? How can they demonstrate their track record? Look for a coach that specializes in scientist coaching.
- Always ask for references and follow up with 3-4 to hear about those clients' experiences. Good coaches will have loads of success stories and plenty of people to vouch for them.

Career coaching for scientists: Why and where do I find one? (CONT'D)

- Trust your gut – only work with someone you connect with. Talk to the coach about their "style" and make sure this is a style that will help you. A good coach usually will be a clear communicator and make direct suggestions for improvement and change.
- Work with the coach to define how you will know that the relationship has been successful – what are the desired outcomes?
- Ask openly for clear information on costs.

Can you suggest some coaches?

Yes I can. Please note that Addgene does not endorse any of these coaches and I can't tell you which one will be a match for your needs, but here are a number I have come across for you to consider. Feel free to add other suggestions in the comments or email me with suggestions.

Most coaches have websites you can review and most create useful online content in the form of blogs or articles. Look for them on Twitter, LinkedIn and Facebook to see their online personas. Some have online coaching tools that can be very effective and also help keep the coaching costs low. Most will work with you remotely (by phone, Skype or Google Hangout) but in-person coaching is nice if you can get it.

Because I am located in Cambridge, MA (and because we have a lot of scientists here) I know many coaches in the Boston area. Sarah Cardozo Duncan is a proven coach who helps people in science and tech get jobs. She is also a very popular speaker and workshop leader. Lauren Celano of Propel Careers is not a professional coach but is a professional recruiter who focuses on scientists. Her website and online content are rich in resources. Colin White and Anthony Collmann of White Consulting frequently do sessions by Skype or phone. Samantha Sutton is another very experienced and successful coach based in New York. Another experienced coach and speaker is Gwen Acton of Vivo Group whose tagline is Bridging Science and Business.

Maybe you just need help getting through your PhD? Some coaches focus on graduate students. For example Dora Farkas, founder of Finish Your Thesis (who has also blogged for us) offers a free report on her website called "Secrets to Success in Graduate School". She has also launched an online career coaching program that might make her coaching more affordable for you. There is also a group The Dissertation Coach based in Illinois. A few of the coaches in this group have scientific backgrounds.

For a stated purpose of transitioning a scientist from academia to industry, you might want to consult the Cheeky Scientist. Their motto is "We Turn Academics into Confident and Successful Industry Professionals". This larger shop might appeal to some although most scientist coaches can help with transitioning out of academia (because so many scientists are making this transition). Another coaching group is Still Point Coaching. One nice thing about a group is that sometimes this offers the option of matching with the best person in the group for your needs. Beth Schachter of Beth Schachter Consulting is part of that group and she is especially excellent in coaching for communication skills.

Industry transition is also an area of specialty for Michelle Capes at Adeptify Me. While based in Madison, Wisconsin she also works remotely and has experience as a scientific recruiter. Chris Humphrey from Jobs on Toast is based in the United Kingdom and scientists there would be lucky to work with him. He is also available for speaking engagements as are many of the coaches I have mentioned.

Career coaching for scientists: Why and where do I find one? (CONT'D)

I have seen a lot of fantastic online content for PhDs and postdocs posted by Toronto-based Jennifer Polk of From PhD to Life. She runs great tweet chats, has an outstanding blog and, while her PhD is in History, I think she would be a good match as a coach for many scientists.

Sometimes it can be helpful having a coach that can offer extra support for issues of diversity in science. A great person to contact is Twitter's @DrQualls. Marquita Qualls of Entropia Consulting works remotely, will travel for speaking engagements and has many areas of specialty from leadership development to mentoring for women and under-represented minorities. Her online content is of great value. I have never been in contact with Aida Baida Gil of Coach De La Professional but the website looks interesting and it is in English and Spanish. She is based in Spain.

The bottom line – there are lots of people out there who want to help. Don't be afraid to ask and to make an investment in your future.

Chapter 5

Management skills

Management for scientists: What makes a good manager?

By Joanne Kamens | December 9, 2014

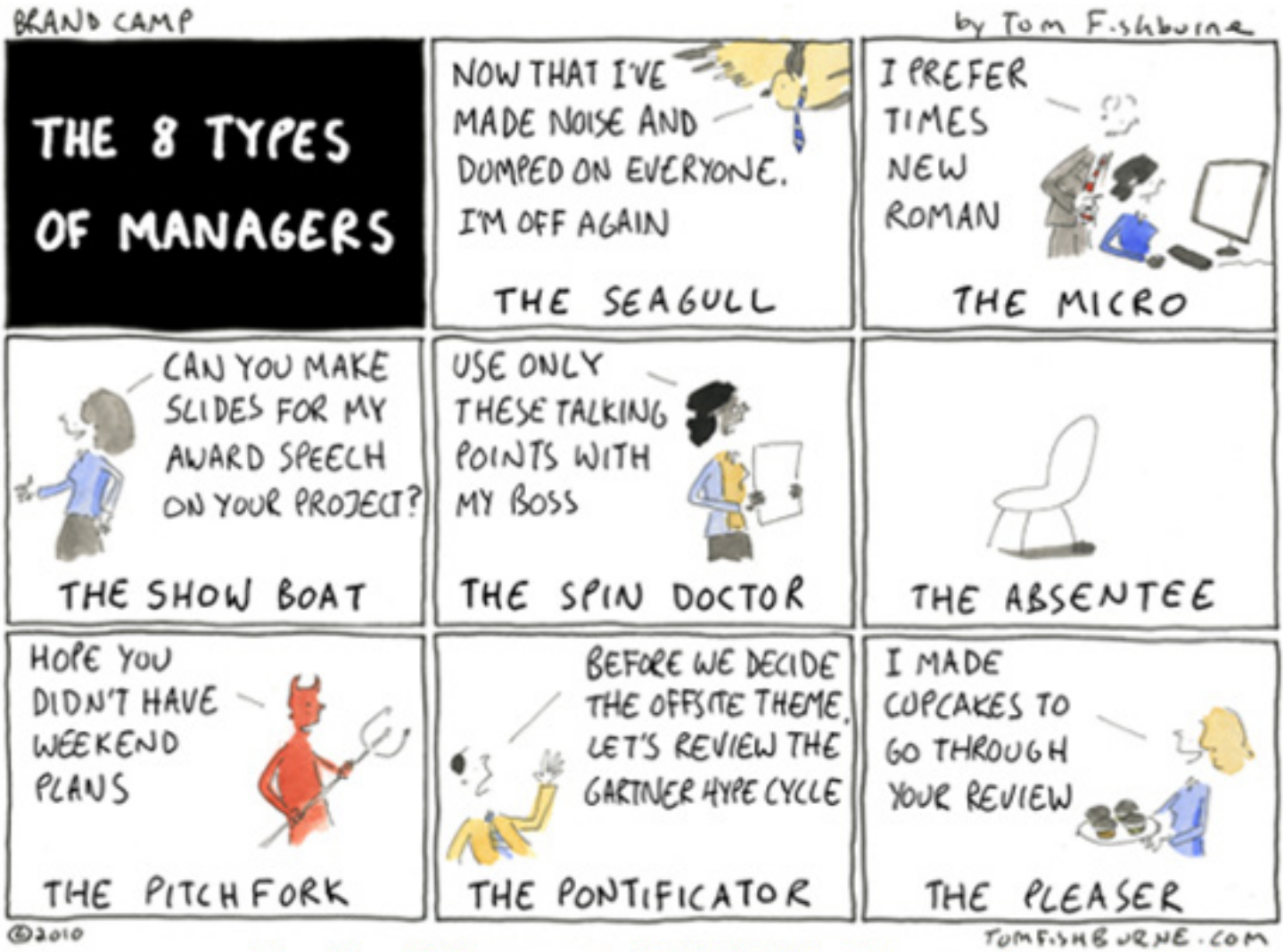


Image credit: http://tomfishburne.com/2010/10/the-8-types-of-manager.html

"I'm slowly becoming a convert to the principle that you can't motivate people to do things, you can only demotivate them. The primary job of the manager is not to empower but to remove obstacles." – Scott Adams, Dilbert cartoonist

If that is all it takes, then how come there are so many bad managers? New managers are rarely chosen because they have demonstrated skill at managing and this is especially true in science. It is assumed that if you are good at science and you are smart, you can be a good manager. The kind of smarts and the type of skills that it takes to be a good scientist are not the same ones it takes to be a competent manager (much less a really good one). While getting your PhD or doing a postdoc few science trainees will have opportunities to work on Emotional Intelligence or to hone delegation skills, for example.

So aside from a focus on removing obstacles, what makes a good manager? First, it takes an open mind to be

Management for scientists: What makes a good manager? (CONT'D)

willing to learn and grow in skills. Managing a team is hard and most people have some learning they need to do before they can be good at it. Like any other skill, it can be developed with education and practice. Second, it takes a focus on the goal. Let's assume that the goal is to work with a team to get a lot of stuff done.

Being a good manager is not the same as not being a bad manager (see cartoon above – what type of bad manager have you had?). You can avoid some of these common pitfalls of management and still not get the most from your team. It is pretty clear that if people are mostly happy at work, they will work harder and contribute more. Assuming basic needs are being met (i.e. enough pay and benefits to live on), the factors that contribute to job satisfaction are a bit surprising. There is a lot of research in this area and studies overwhelmingly agree that these are the factors that most contribute to job satisfaction:

A feeling of being appreciated and valued

- This often stems from being included in organizational decision-making. It is imperative that employees are thanked for their work by the words and actions of their managers. You can't just think it, you have to tell them. A good manager learns that her success and recognition come from the successes of the team.

A strong sense of engagement in the work

- Behind-the-scenes support from their bosses and employers. Availability of superiors for consultation, advice and brainstorming. Employees must understand the part they play in the goals of the organization and feel the importance of their contributions.

Flexible work schedule

- Flexibility to manage their personal lives to achieve a healthy work-life balance. It is harder to manage when the measure of work is not just time spent at the desk, but it is worth it. This requires a focus on deliverables. It does not mean a manager must allow his team to work mostly at home.

Having a high degree of freedom and diversity built into their jobs

- Chance to do/learn new things, diversity of responsibilities, which might include training or teaching others, research, and policy development. Every worker at every level does better with some variety in their job.

Good relationships with clients and colleagues

- Sometimes this means you have to fire a good performer if they are enough of a jerk to make the rest of the team miserable.

A good manager keeps these factors in mind at all times when making decisions, assignments and polices. Sometimes the boss has to be the boss and make difficult and "unpopular" decisions, but that should not be the common mode of operating.

Management for scientists: What makes a good manager? (CONT'D)

I should add a few special words about managing scientists because, let's face it, we are special. Below are some special characteristics of scientists in the work place as described by Sebastiano Massaro in his Nature Biotechnology article "Managing knowledge-intensive workers". I have added a few comments of my own to this list.

- Need feedback on their work but prefer to be approached as peers rather than subordinates
- Need mental space and dislike intrusions (this actually varies, a manager does best to indentify the work style of each team member)
- Need challenging work, opportunities to pursue and problems to solve (I think this is true of most people, not just scientists)
- Are self-directed, but need precise leadership and support from their superiors (beware of not micromanaging the scientist if you want their best work)
- Are continuous learners and have individual priorities for advancement in science
- Have their own working schedules and may not necessarily be comfortable with imposed deadlines (there's that need for flexibility, sometimes taken to an extreme by scientists)
- Are highly mobile and can move to a new workplace if opportunities for learning and personal growth do not exist or if they feel underutilized in their present positions

Further reading

Good introductory reference books on managing people:

- Skills for New Managers by Morey Stettner
- Successful Manager's Handbook: Develop Yourself, Coach Others

Management for scientists: What makes a good manager? (CONT'D)

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Managing vs. leading

By Joanne Kamens | March 31, 2015

We are inundated with articles and books on the topic of leadership. Perhaps one of your advisors or mentors has urged you to work on developing your "leadership skills". Leadership is prized at all levels of an organization and is also one of the most common criteria required for a promotion. Yet little explanation is given for how someone can or should demonstrate this quality.

I am often asked to give career seminars on Leadership Skills. After attempting to put together such a presentation many times, I could never actually figure out what skills were really leader-specific. How is leadership different from good management? Aren't all career skills leaderhsip skills when done well? Do you just have to know it when you see it?

"The Three Stages of Your Career: Doer, Manager, Leader" by Charlotte Beers, divides workers into three cycles: Doers, Managers and Leaders. I like her use of the term "cycles" instead of levels because it emphasizes the importance of these very different roles. At any stage in our careers we may be in a cycle of doing, managing or leading. All three roles are important to accomplishing any goal or finishing any project.

Doers are the ones who do the work

Doers focus on understanding what is expected of them and learning new skills to get the work done efficiently and with high quality. Their work involves coordination and can require technical mastery. Scientists need to be doers for a long time before they master the skills they need to be successful. Scientists are lifelong learners so we are all likely spending a lot of time in doer mode even late in our careers.

Managers make sure the work gets done

Managers do this by removing obstacles that stand in the way of the doers and by ensuring good communication. A manager must both hire and fire to make sure the team is the best it can be. Managers must ensure that their teams are working well together and collaborating effectively with other teams. While they sometimes dig in and do some of the work, they must be more focused on delegating tasks and in motivating their doers by ensuring they are as engaged as possible. To learn more about being an effective manager, read the other sections in this chapter and check out more resources on the career section of the Addgene blog.

Leaders look to the future

Leaders must get new things started and then step back to let others take the reins. They work alone much of the time, depending on the organization they lead. Effective leaders rarely give orders (although they must

Managing vs. leading (CONT'D)

occasionally). Good leaders exert influence in other ways. While good managers must motivate their teams, it is the leader's job to provide the driving inspiration, to create a productive culture and to correct systemic problems.

Understanding these three roles allows you to identify what you need to do to be successful in a specific role or cycle. For example, if you try to lead when you are expected to be doing, you may not be recognized as successful because you are not fulfilling the requirements of the current task.

Most of us start as doers, some become managers and some take on leadership roles. You may be happy with a primary role of doer for your entire career. Scientists train as doers and often maintain an enjoyment in the doing. Many science managers or leaders will tell you how much they miss the hands-on bench work. To really be happy, you may need to find a way to do, manage and lead all in one day.

How do you convince others (in particular your boss) that you are ready to try operating in a different role? I think the secret sauce can be summed up in one word – initiative. Initiative is the ability to assess and initiate things independently.

Taking initiative doesn't mean going rogue, pointing out problems or highlighting criticisms. To be given the opportunity to take on the role of leader, one needs to take the initiative by bringing and effecting solutions to both known and unidentified issues.

Further reading

There are many good resources on the skills and characteristics of successful leaders. Below I've listed a few of my favorites..

- Fire, Snowball, Mask: How Leaders Spark and Sustain Change, by Peter Fuda and Richard Badham
- Leadership Insights for Engineers, Scientists and Computer Professionals as Leaders, by Ken Graham, Ph.D.
- How Good Are Your Leadership Skills? Mind Tools Quiz Activity
- What Got You Here Won't Get You There: How Successful People Become Even More Successful, by Marshall Goldsmith, with Mark Reiter
- Harvard Business Review 10 Must Reads: On Leadership (Articles on Leadership, also can be purchased individually)

Management for scientists: Delegating is key

By Joanne Kamens | February 20, 2015

Once you are responsible for managing others you will only be successful in your role if you become a master at delegating tasks and responsibilities. The manager is not expected to DO all the work – she is expected to make sure the work gets done and done well. Involving your team effectively is now your new measure of success. It is imperative that you resist the temptation to "just do it myself" or micromanage –you don't have time for that and you won't be as productive. For example, the many resources avaliable on the Addgene website didn't come into being through the actions of a single person but through the coordinated efforts of many individuals.

Benefits of delegating

The bottom line – delegation allows you to get more done. There are also a host of other advantages to practicing effective delegation skills:

- The team will be stronger and less dependent on the manager to succeed.
- More people in leadership roles leads to more ideas, initiative and creative thinking.
- The team members will be more invested in the projects and outcomes.
- The quality of the work is often dramatically improved when tasks are distributed appropriately.
- If team members have opportunities to develop and stretch then they will be happier and more productive in the long run.

If you are overwhelmed with your to-do list and your team doesn't seem to have enough to do...you are not delegating enough.

For example, if we need to develop a new plasmid collection page, we certainly don't expect that one person will write all the copy, design every icon, curate all of the appropriate plasmids, and code the entire page. That would be entirely too much work for one person, it would take forever, and the end product would likley be poor quality. Instead, we pull together teams of individuals who enjoy and are experts in each of the individual tasks required to develop the web page. The team manager must then faciliate appropriate communication between members of the team to ensure that no component of the overal project gets left undone or is duplicated. With each component of the project completed by an individual who is a local expert in that task (or has the bandwidth to become an expert) the end result is high quality and the entire process is completed more efficiently.

Recipes for delegation success

Remember that there are always things that the manager must do. You can't delegate the giving of feedback or performance review. You can't delegate tasks assigned to you and you must usually take on all tasks that involve confidential information. No matter who you delegate to, or what tasks you assign, the manager is ultimately

Management for scientists: Delegating is key (CONT'D)

responsible for outcomes. Be ready to support your team and take responsibility if things go wrong.

Here are some important criteria for delegating tasks appropriately:

- Are the desired goals and outcomes clear? If you don't have clear outcomes in mind, you won't be able to communicate these well to the task assignee and this is a recipe for bad outcomes. Clearly articulate the desired outcomes. Begin with the end in mind. Specify desired results.

- Are you delegating to someone with sufficient skills and experience? Do you think you are giving this responsibility to someone who can do the job. It is good to delegate so the person doing the task will have to learn and stretch a little, but be careful not to go too far.

- Is the assignee interested in this task? Don't give out tasks – where possible, include people in deciding what is to be delegated to them. Not all tasks are fun, but getting buy-in when delegating can help ensure successful results.

- Can you provide the information and resources needed for the assignment? Setting someone up for failure by delegating is a bad idea.

How do I make sure it goes well?

As with most managerial responsibilities, good communication is at the heart of delegating for success.

- Meet regularly before during and after the assignment to discuss goals, expected outcomes, timelines and deadlines. Agree on a way to review project progress. I recommend putting a regular check-in meeting on the calendar even if it is just 15 minutes a week.

- Clearly identify constraints and boundaries. Where are the lines of authority, responsibility and accountability? What types of issues do you want to know about right away?

- Provide adequate support. The manager must be available to answer questions. If you are perceived as too busy to be approachable mistakes will be made that could have been prevented. Make sure everyone understands that no question is "dumb" and that it is better to ask before wasting time.

- Focus on results. What does success look like? Agree on desired outcomes. Concern yourself with what is accomplished, rather than detailing how the work should be done. Your way is not the only way and may not even be the best way. This facilitates success and trust. Micromanaging is bad for everyone.

- Document action plans! As a project progresses it is easy to forget the original plan. Write down your plans in a shared document. Update frequently with progress reports, meeting minutes and plan changes. Written documentation helps make sure everyone is on the same page.

Effective delegation allows you to make the best use of your time and skills. It also ensures that other people in the team grow and develop to reach their full potential in the organization. This will result in more engaged,

Management for scientists: Delegating is key (CONT'D)

successful employees who can accomplish great things.

Further reading

To read more on this topic and for additional best practices try "Why Aren't You Delegating" in the Harvard Business Review. Another excellent blog on delegation tips and practices can be found at the Time Doctor Blog "The Art of Delegation: Developing This Essential Managerial Skill."

Management for scientists: Giving feedback

By Joanne Kamens | February 6, 2015

Feedback is help and it should result in authentic assistance for the recipient to become more effective and successful. Giving timely and useful feedback is an absolutely required aspect of being a successful manager. Great bosses tell people where they stand clearly and routinely. They are clear with each employee about what they do well and where they need to improve, and they're also clear about how the person is doing overall. Employees hate to wonder what you think of their work.

Guidelines for giving feedback

- Use formal and informal mechanisms for feedback (more on this below).

- Make sure to give positive feedback when it is merited. Surprisingly, some people find this hard so get used to it by making it a concrete goal to say "thank you, job well done" to one of your employees every day.

- Prepare for a feedback session by writing down specific examples and notes so you can get back to the issues if the conversation gets off track or becomes emotional.

- Don't let things fester, give feedback as close to an event as possible. If you wait too long, a small correction can become an unnecessarily big issue for you and for the employee.

- Make sure to focus on the action, not the person - intent is usually good.

- Don't pretend something went well when it didn't... but don't "punish" someone for a past infraction. Feedback will only have a positive outcome if the employee sees that real change is possible in your eyes so their confidence is restored. A good manager does not hold grudges.

- Never use email to deliver corrective feedback. A manager must be able to respond to the employee's level of discomfort appropriately to get the message across.

Formalizing the feedback session

Giving regular, informal feedback is a very effective way to bring about change in behaviors and habits in a nonthreatening way. However, I have also found that scientists seem to find it easier to give feedback in formal sessions using a specific list of questions after a task or period of work. Using this standard format not only enables you to discuss a person's performance or what has been learned, it helps to plan effective next steps. For a formalized feedback session, answer the questions below together and discuss openly. Both parties get used to using this format and it becomes even more effective over time if you take it seriously.

Management for scientists: Giving feedback (CONT'D)

Person who will receive feedback does a self-assessment (of the task or period of work):

- What 3 things would you say worked out best?
- What 3 things worked least well?

Manager provides feedback (may be the same as self-assessment or different):

- Here are the 3 things I would say worked out best.
- Here are the 3 things that worked least well.

Find out the Effect of the Feedback:

- How does this feedback compare with your own perception?
- Tell me your interpretation of my feedback to you.

What are We Learning:

- What would have happened if _____? What would have been a better outcome?
- What help did you need? What help did you solicit? When did you first see you needed help?
- What kept you from getting the help you needed?
- What could I (manager) have done differently?

What Can You Learn Going Forward:

- If you could plan this all over, what would your plan be?
- If you could do the thing all over, what would you do differently?

Beware of indirect language

You must be honest about performance problems. While giving corrective feedback isn't pleasant, it's far worse for employees if you don't care enough to tell them about areas they need to improve in. If a manager has concerns about an employee and the employee doesn't know it, the problem is as much with the manager as with the employee. This is especially true if the problems are large enough that the employee should be aware that they are at risk of being fired and should be looking for a new position.

One of the most common mistakes I see is managers who hint at or use indirect language to talk about real performance issues. Watch this little video to learn more about indirect language from Steven Pinker. As a manager you must be able to state your observations truthfully and in clear terms. It isn't necessary to be cruel, but is necessary to be direct and clear. There is place in human discourse for indirect language, but it is not the way to go when giving feedback. The employee is not helped if the feedback session is over and they still don't know how you actually feel about their performance. Giving honest and helpful feedback gets easier with practice so you must build it into your routines.

Management for scientists: Giving feedback (CONT'D)

Further reading

For more reading try The Discipline of Teams by Jon R. Katzenbach and Douglas K. Smith or the book on which this article is based.

Management for scientists: Seeking feedback

By Joanne Kamens | January 8, 2015

Successful management can almost be boiled down to one, key concept: Creating a culture of excellent, effective communication between all members of a team. As described here in a 2012 Intuit blog post, a study coming out of MITs Human Dynamics Laboratory identified five characteristics of very successful teams.

Here they are annotated with my comments:

Everyone on the team talks and listens in roughly equal measure, keeping contribution short and sweet.

- One key to this is ensuring that the group always conducts exceptionally well-managed meetings.

Members face one another, and their conversations and gestures are energetic.

- This can take practice and training. This is important because it creates a culture of engagement in the issues at hand and eagerness to get, as well as give, information to make improvements.

Members connect directly with one another – not just with the team leader.

- There is no way a manager can be efficient without delegating and empowering the team to solve problems together (tactics for effective delegation are discussed here).

Members carry on back-channel or side conversations within the team.

- We are not talking about gossip here – this means encouraging a culture of maximum information flow so everyone knows what is going on and can contribute.

Members periodically break, go exploring outside the team, and bring information back.

- No team has all the answers – reinventing the wheel is inefficient. An effective team regularly seeks expertise wherever it can be found.

Seeking feedback frequently

One of the most important paths of information flow is the one that brings feedback back to the manager. Team members rarely rush to give honest feedback to the manager for a variety of reasons. They may feel that giving feedback will be perceived as complaining. They may worry that it seems like "tattling" if others are involved. They may feel they are wasting their time. The manager may appear to be too busy to be receptive.

Whatever the reason, it is a fortunate and successful manager that is genuinely receptive to feedback and so receives this valuable input from at least some employees. Watch out for "information allies" – these are employees in your group that regularly step up to give feedback and fill you in on percolating issues with the team.

Management for scientists: Seeking feedback (CONT'D)

Here are some other practices to encourage constructive input from your team:

Solicit feedback regularly and often

- A one-time event doesn't work to get people sharing.
- Frequently ask direct questions for specific feedback in non-public settings. Ask over coffee.
- Have regular 1:1 meetings with team members (don't become known for cancelling these); ask for feedback and input on multiple topics every time you meet.

Seek feedback in multiple formats

- Ask for input and opinions in meetings, via email, at formal communications events or at informal gatherings, like at lunch.
- Many experts recommend using anonymous surveys with regular frequency. Anonymity can be a great way to get honest feedback, but shouldn't be the only way.
- From a colleague: MBWA "Manage By Walking Around" – don't hide in your office. Stop by instead of emailing.

Demonstrate you are open to feedback with your actions

- Use active listening skills such as the PAC method. P = demonstrate patience, pause; A = ask at least one question to clarify the situation; C = confirm that you have understood the speaker accurately.
- Thank employees who volunteer constructive feedback and suggestions. Consider offering rewards (gift card, afternoon off, etc.)
- Act on information to make change whenever possible. Be public about changes influenced by feedback. If you don't do this, employees will stop providing feedback pretty quickly.

Further reading

For more reading try The Discipline of Teams by Jon R. Katzenbach and Douglas K. Smith or the book on which this article is based.

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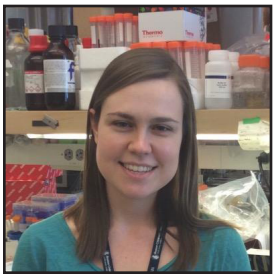

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