There and back again

John Boyle

Vacating industry and joining the academic ranks means leaving the world of order for the satisfying chaos of research.

After more than 10 years working as a senior and executive manager in a range of pharmaceutical-related companies, as well as time spent in presales, strategic planning, contract negotiation and management consultancy, I made the decision to move back into academia—the thought of working on diverse, cutting-edge research problems had tremendous appeal. So it was with a degree of excitement that I took up the role of director of informatics at the Institute for Systems Biology. The time immediately after my move was filled with a sense of amusement at the sheer chaos surrounding research and wonderment at the scale of the tasks researchers aimed to complete. I realized I had become accustomed to the patterns and structure of industry, so the first few months back in academia were a shock.

I have been at the institute for 5 years now, published more than 30 papers, led a large research team and been awarded multimillion-dollar grants. I can say the move has been an unequivocal success. Yet my change in environment required rethinking priorities and shifting my work manner, and I needed to accept the madness that is academia. I have come away with three salient realities to be considered when making this jump: there is no discernible product, research is emphatically individualistic and the rewards and career progression are generally very different from that in industry.

There is no product

In general, research is about expanding the breadth of human knowledge, and there is rarely an end-point or measurable outcome. Furthermore, science itself needs to be reactive and adaptive because researchers around the globe are constantly making discoveries.

This is not something I fully appreciated when I entered academia, and I found the fast pace with which new projects were undertaken, and their scope, to be staggering. New projects tend to be all about excitement, diversity and innovative ideas. However, many projects do not actually get started, others change beyond all recognition as the science underpinning them evolves and some last only until the first publication. This means that there is often little consideration for the feasibility of a task or the available resources.

This lack of certainty (and in many cases, lack of management structure) means that coordination is wanting and inefficiency is rife. It is generally expected that groups of people will spontaneously organize themselves around ideas without any formal mandate or structure—a style some have called 'managing from below'. This can be entirely frustrating, but attempts to change it are futile.

For example, once I had arrived at the institute, I found I was able to manage multiple ill-defined projects with ever-changing priorities and goals while avoiding bottlenecks—a useful skill. But I also tried to quell the chaos by introducing formal project management and process, and in this I failed miserably. I could not demonstrate the usefulness of structure and strict planning for the short-focused, siloed projects that typify research, and I realized that any management practice that introduces a burden to research will stifle creativity and be met with hostility.

This meant I had no choice but to accept the inefficiencies, such as the endless cycle of late-starting and over-running meetings. Academics, when faced with nearly any problem, call a discussion meeting. There is often no agenda, and people are invited regardless of involvement in the project; thus, meetings often include many attendees voicing protracted opinions on various topics. However, it is in these long-winded meetings that many researchers best communicate, and gatherings like this can lead to innovations, such as single-cell assays, lab-on-a-chip microfluidics and high-throughput long-read sequencing. This is worth remembering when you are sitting in another meeting that has no end in sight listening to five people repeat each other.

The most important thing for anyone making this career move to realize is that these methods do not need fixing. They are, in fact, necessary for academic blue skies research to flourish (**Box 1**). Academia requires free thought, boundless enthusiasm and passionate ambition to do what others could not. Tying all that up in deadlines and structure kills the process.

Research is individualistic

Grant-based research has a short-term focus, which necessarily emphasizes individual accomplishment. The leadership of any academic institution is used to this type of environment, and it is not unheard of for even senior professors to have no concept of teamwork or motivational skills. It is also an uncomfortable truth that juvenile behavior is more common in academia than in commercial environments.

After moving to academia, I was surprised to find that the principal investigator (PI) has nearly unlimited authority. As in any monarchy, problems arise if the leader is not benevolent, experienced and well adjusted. Academia is full of horror stories of PIs hiding under their desks and refusing to come out, flying into rages if other researchers dare take public holidays or rebuking random individuals because they cannot find the person they really wish to yell at—these tales are all true.

I have seen PIs replace senior staff with close friends who have no qualifications, dismiss professional staff as mere assistants and publicly inform subordinates of a drastic pay

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Box 1 Blue skies ahead

I was involved in the development of targeted proteomics tools for the detection of peptides at a few molecules per cell resolution. The goal was to provide a comprehensive map of the assayable human proteome, principally for the development of biomarkers. On paper, the project concept was simple: it involved the synthesis of 100,000 peptides and the subsequent elucidation of their suitability to act as protein-specific biomarkers by measuring their mass spectrometry signal response. These data could be used to develop targeted selective reaction monitoring assays by choosing a specific set of proteins of interest, and then the most suitable transitions would automatically be identified.

The reality was much harsher. We started with a nearly blank sheet. We had no laboratory automation, the machines were not in place, there was no sample tracking, glassware was in short supply and there was a severe shortage of full-time employees. What we had was enthusiasm and a great deal of experience.

I was amazed that something elegant and useful arose from the mess. I found that although meetings were rambling and directionless, the best ideas were still carried forward. Time scales were limited to weeks, and we overcame problems through the flexibility of the people who worked on them. We came up with new ideas or methods to replace the things we could not fix. The result was a comprehensive atlas of proteomics markers and the development of tools to aid in using the markers as diagnostics. This was done in a matter of months, and it generated a large number of high-impact papers and led to several grants.

reduction, then accuse them of poor fiscal responsibility if they complain.

A bad PI can have a substantial negative impact on those working for him or her. I have heard of a PI attempting to stop a senior scientist from doing research by removing access to data and equipment on active projects, then turning around and taking away funding or dismissing a succession of people who collaborated with the scientist in question. In another case, a PI fired three lab managers in the same year, then refused to provide job references and blocked publications involving any previous lab members, including prospective PhD students. Unfortunately, there is often little recourse for the people being targeted as there are typically no warnings or formally stated reasons for why any of these events are happening, and there is no official involvement with a human resources department.

When working relationships deteriorate to this degree, the people being targeted simply finish up their research and then leave the respective organizations. Although these events are not common, they occur with greater frequency than one might expect.

These are the PIs you need to avoid if possible. Conversely, it is true that many, if not most, PIs aim to improve the careers of those that work for them. These are the people you want to work for, and the easiest way to find these gems is by looking at the career paths of previous scientists—in the best labs, members go off to start independent groups. When moving into academia, consider your potential new lab and look at both those who have left and how productive the lab as a whole has been concerning papers and grant money. Ask hard questions (**Table 1**), and remember that a lab with just one grant that was not renewed, filled with people unable to publish in high-impact journals, is not one you wish to join.

Career-progression change

The career arc and compensation realties in academia are substantially different from those in industry. Obviously salaries and benefits are much lower, and bonuses are nonexistent. In addition, career progression is at best semi-structured. Because the ranks of academia are quite flat, you either run a research group or facility, or you do not. Progression within a single organization is typically achieved through filling a dead person's shoes; thus, developing a career can require moving positions every three to five years.

Advancing in academia is also linked to one's ability to obtain grant-based funding, and such funding may be required by your institution before you can enter faculty ranks. Certainly it is needed before creating your own group. However, if you are moving from industry, it is likely you will be part of a funded PI's group, so this is another reason to get an accurate assessment of any potential employer's success and try to gauge the coming years—otherwise your job could suddenly disappear when grants end.

The only real protection from this sudden lack of employment is through obtaining your own funding. Your own grant places a buffer between you and job insecurity. When you go seeking an academic job, make sure you will have the authority to write grants in an area in which you have a reasonable chance of success. To land funding, you will need to demonstrate that you are uniquely qualified to do the work, that it is of groundbreaking importance and that it will advance the aims of the grant authority.

You will also need to find your niche. When I moved back into academia I found that my niche was slanted toward technology development rather than pure research. Developing your own niche will help you focus on your strengths and increase the chances that you will be successful both in obtaining funding and at conducting the research at hand.

I had to learn early on that grants are pretty much an all or nothing endeavor as there is a limited scope for resubmission. Once a proposal is rejected, it is time to move on to the next idea. Receiving grant funding is not an easy matter, especially as you will be competing with others who have been working in academia all their lives, so you should get used to rejection—it is

Table 1 Questions to ask when deciding whether you want to join a lab

Aspect	Question
Lab strategy	What is the strategic direction? Is it clear, exciting and scientifically important?
	Does the lab have a diversity of grants, and do they fit the stated direction?
	What grants are being targeted for future applications?
People	How many papers have been produced by members of the lab for which the principal investigator is last author?
	How many people have moved on from the lab to establish independent research groups?
	Talk to the individual researchers; what are their most recent first author papers, and what is their next research goal?
Organization	Is there a management structure to the lab or does the principal investigator appear to lack organization?
	Do the scientific collaborations fit the strategic direction of the lab?
	Are there any restrictions on applying for grants? What support is available?

part of the academic life. Since my return, I have been fortunate enough to have been awarded two US National Institutes of Health research project grants, as well as several other grants, but I have also had countless grants rejected and had the embarrassment of having a well-scored grant do substantially worse when resubmitted. Through the grant application process, I found that my industry background was not always beneficial, and at times reviewers objected to my applications because they felt my commercial experience did not qualify me to do research. One went so far as to criticize me (and others) for not publishing in the years that we held commercial jobs.

Tailoring your proposal to your unique set of skills gained from industry can help ensure your industry background is considered favorably. If and when you do obtain your first grant, it will feel like a fantastic opportunity: a sum of money specifically for expanding your ideas and advancing the world's sphere of knowledge. There is nothing like it.

It is also worth remembering that if you find yourself pining away for industry after jumping to academia, there are always startup opportunities. Many academic institutions now have well-structured intellectual property departments to aid in the commercialization of ideas, and people have found that the absence of noncompete clauses and nondisclosure agreements often gives you more free rein in this area.

Satisfaction is hard earned

This article may read as grim, but I have few regrets about moving back into academia. Looking back, I realize it took me a good two years to adjust and slip back into the academic way of doing things. Over that period, I grew a thicker skin to cope with the complex personalities and wayward attitudes I encounter in academia—today, any bizarre rudeness just amuses me. My job gives me the freedom to explore new ideas and the chance to score grants to fuel the research. I work with passionate and creative people, and the flexibility in my schedule allows me to see more of my children.

Of course, the largest benefit will always be the work itself—it has been all I wanted it to be. In one frantic month, I was tasked with mapping thousands of cancer genomes to look for common variants, investigating global health issues from five geographically distinct laboratories and analyzing five years of mass spectrometry experiments to look for disease-related biomarkers. I have been given the opportunity to try my hand at nearly anything, and I am able to reach out to experts to provide assistance. The challenges that academics face are enormous and the resources meager, but there is unbridled enthusiasm to explore the problems and a willingness to try different approaches. For me no other job (and I have had more than a few) has the same level of personal reward.

COMPETING FINANCIAL INTERESTS
The author declares no competing financial interests.