Reflections on the modern lab

While seasoned principal investigators always appear to have their labs under control, running a lab is a learning experience. **Nathan Blow** talks with two established PIs to find out what they have learned about life in the lab over the years.

The amazing thing about Robert Langer, professor of bioengineering in the Chemical Engineering department at Massachusetts Institute of Technology in Cambridge, MA, just might be how easy he is to reach. Within minutes of sending an email to him, the reply is often in your mailbox.

"I tend to use the BlackBerry a lot, and respond to people quickly," says Langer, who prides himself on such a high level of accessibility. Langer is not the only scientist these days using the latest technology to help manage communications in the lab — the ability to rapidly contact and answer questions from members of your lab, no matter where your location, has become a common feature of the principal investigator lifestyle.

Langer's lab might be an extreme case when it comes to communications though — he manages arguably the largest biomedical engineering lab in the world, with 80-100 people at any particular moment, depending on how you count it, and millions of dollars in funding each year. So, the rapid fire pace of his responses enables him to keep updated on the inner workings of the lab, his staff, and students and address their needs.

Robert Langer, professor of bioengineering at Massachusetts Institute of Technology, in his lab. Photo: Ed Quinn

Brian Strahl, an associate professor at the University of North Carolina, Chapel Hill studying epigenetics, has also seen the benefits provided by quick communication with the members of his biochemistry lab. "It enables the rapid decision-making and information flow among researchers that is needed to be successful in science these days." The rise of rapid communications is just one of many changes that has filtered into the research lab in recent years. Like it or not, change is a fact of life in the lab.

Full-time, always on-call faculty

"Email and smart phones have actually changed people's perceptions; you are now expected to always be available," says Strahl who gives a personal example of the times he has "checked email" while at home making dinner or playing with the kids.

For established PIs like Langer and Strahl, this evolution in the way scientists communicate was witnessed

Brian Strahl, right, an associate professor at the University of North Carolina, Chapel Hill, with one of his postdocs Scott Rothbart.

firsthand during their time as lab heads. In 1993, Strahl shared a lab computer with his fellow graduate students and his first email account yielded one to two messages a day at best – flash forward to 2012 and everyone has their own computer in his lab and he personally receives at least 50-80 emails a day. Availability has also changed usage — in 2002 when Strahl started at North Carolina, he would not check email over the weekend from home. Today, not even dinner is safe from the buzz of the iPhone, and two days without access means nearly one full day of answering emails to catch up.

While some worry about the “connect-ness” among lab mates translating into less time for “decompressing” and getting time away from the lab to spend time with family and friends, technology may not be the only driver of this phenomenon — in today’s ultra-competitive world of scientific research where less funding and more competition are the trend, the need to stay in touch and find the next big thing may mean sacrificing some of that ability to “get away from it all.”

“There is a tremendous demand to be the first to publish, or get a grant,” notes Strahl, “and getting started immediately on a great idea is the key to that success.” And for PIs it is about more than just

staying in touch on research topics in many cases; they need to multi-task effectively in their positions, and this can be achieved with the assistance of modern technology.

Langer’s BlackBerry is the way he deals with myriad responsibilities encountered on a daily basis: running a lab, teaching, serving on committees, grant writing, and the list goes on. Running an established lab in 2012 is about more than the science: PIs have to be scientists, business professionals, and administrators to be successful.

Lessons learned

Langer, who started his first lab at Massachusetts Institute of Technology in the late ’70s, learned how to run a lab by doing. During the early years, like many investigators, he struggled with limited resources while trying to establish a lab and secure additional funds to drive his research forward.

“Initially, I got very little start-up funds so I spent much of my time writing grants,” recalls Langer, a common refrain even today (see pg 141: “Run your lab on dollars a day!”). But he is quick to add that the experience and lessons learned from those early grant submissions guided him toward the lab he has today.

Interdisciplinary research and collaborative projects might seem the norm in 2012, but not so 33 years ago when Langer opened the doors of his lab. “I was surprised at how negative reviewers often were about new ideas,” he says. “And the scientists who wanted to do interdisciplinary research.” Of which, he was one. But a persistent Langer would find early funding, which allowed him to start the multi-disciplinary studies that are now a staple of his lab in 2012.

While much has changed and grown in Langer’s lab over three decades, he says that there are still two simple principles he continues to follow to this day: solve problems that have a major impact on the world and be fair when it comes to credit.

“I would much rather err on the side of being inclusive than exclusive when it comes to items such as credit on papers,” he says, noting the need to be generous when it comes to making decisions in the lab.

Lab drift

When Strahl started his lab at Chapel Hill 10 years ago, he initially emulated the way in which the well-established lab where he was a post-doctoral fellow (David Allis’s lab, now at Rockefeller

University) was run to mold his own new environment.

"I wrote down all the instrument serial numbers, and catalogued everything on the chemical and reagent shelves that were in the [Allis] lab," recalls Strahl. His goal, much like anyone starting a new lab, was to get his research efforts up and running as quickly as possible. And while such "set-up borrowing" is a great way to start a lab, as anyone who has ever worked in a lab can tell you, each and every lab has its own unique atmosphere and procedures; everything, even a lab, evolves with time.

"Over the years, the lab drifted in its own way," says Strahl. As new people joined Strahl's growing lab they brought with them new techniques and ideas, and his lab started to change shape from the Allis lab, creating its own way of doing things – a process Strahl refers to as "lab drift."

"This drift or process of bringing in new ideas and improved ways of doing things is an important part of a lab's growth and development," says Strahl. This comment brings up another important aspect of the PI lifestyle, finding and supporting the right people who will work in your lab.

Many established investigators seek out students and post docs who can quickly take charge and drive a project forward, which are traits needed to obtain grants and ultimately succeed at the next level. "Today, you need high impact papers to get a high-profile position; nothing short of an outstanding publication record," explains Strahl.

When it comes to his own lab, even Strahl feels the anxiety and stress of tight budgets and low paylines. "You're rich one day, and poor the next," he says. "Nothing is worse than having a fantastic idea which cannot be catalyzed due to lack of funds."

Words to the departing

But what do you say to those post docs ready to leave? How do you explain the challenges that are ahead? "I'm honest about becoming independent with my students, I tell them that it is tough," says Strahl who often advises his students to be prepared for rejection, whether it be a grant or a manuscript, and to learn not to take it personally.

Langer and Strahl both agree that communication with other department members is critical in the early years for

any young faculty member. "Think big, and don't be afraid to get advice from other faculty," stresses Langer.

In the end, established PIs are still in many senses enthusiastic graduate students at heart. For all his work and challenges, Strahl is exactly where he wants to be. "We dream up exciting projects that make an impact – it's interesting and fun. Most days, I can't wait to see the results."

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