From Physics to Marketing

According to the National Academy of Sciences' 1995 report *Reshaping the Graduate Education of Scientists and Engineers*, fewer than half of science and engineering Ph.D.'s are now employed in academia. The statistics only confirm what every postdoc already knows: it is increasingly difficult for young scientists to follow the traditional career path. As a recent graduate, I have faced this dilemma myself. My experience shifting from physics to business might give some useful ideas to other new Ph.D's now seeking permanent employment.

Frankly, I am saddened by the number of scientists I see waiting for an academic position when solid opportunities in the business world go begging. So few academic positions become available each year that the odds are against even the brightest graduates. The business world, on the other hand, offers many excellent opportunities for people with technical knowledge and an advanced degree in the sciences.

My own career is a good example. When I obtained a Ph.D. in physics from the University of Maryland, it certainly looked like I was headed for a research position in a university or industrial laboratory. But things turned out otherwise. Although many academics privately regard the business world as tawdry and motivated solely by profit-making, I was fortunate enough to have a more broad-minded advisor. Professor T. "Venky" Venkatesan had all the skills needed to succeed in business. Venky had worked at Bell Laboratories for 17 years before joining the faculty at the University of Maryland. At the university, he ran a research group comparable in size to a small company.

We never encountered financial hardship, even when research budgets were rapidly shrinking elsewhere. Indeed, Venky was also running a small business of his own at the time. He encouraged his students to consider a business career but, more important, he showed us that a physicist could be a successful businessman.

One of Venky's students was Arun Inam, another good role model. Arun was hired by Bell Communications Research (Bellcore) after completing his Ph.D. Soon afterwards, the company began cutting back on basic research. Arun, who had been hired as a scientist, worked with the management consultants who were helping Bellcore define a new direction. Using the skills he had developed in the process, he made a successful transition to management consulting.

New on the block

The transition from academia to business was not easy for me. Despite my enthusiasm, it was difficult for a newly minted physics

Ph.D. with no work experience to find a job in early 1994, when the economy was still recovering from a recession. Although I was interviewed by management consultants and banks, which have recently made use of physicists to construct computer models of financial markets, I received no offers. Nerve-racking as this was, I was determined not to sell myself short and settle for a job that paid little or that did not make use of my abilities; an employer, after all, is unlikely to value you any higher than you value yourself.

As a graduate student, I had worked on infrared sensors made from high-temperature superconductors, but like most graduate students, I had also been a factotum—the odd-jobs man. Among other things, I developed the software programs for computer-controlled experiments in the laboratory. Well before I graduated, I had begun also to take every opportunity to introduce myself to potential employers.

First job

One company that seemed interested in my skills was a small software development firm founded by C. P. Yang, who holds a Ph.D. in biophysics from Carnegie Mellon University. Despite his love of physics, Yang realized that he wasn't cut out for academic life and wanted to try something more entrepreneurial. After he graduated, he was hired by Microcal (Northampton, MA), a calorimeter manufacturer, to develop a data analysis program for use with its instruments.

Yang made the crucial decision to develop this program in the then little-known Windows environment. In 1991, when Windows began to achieve widespread acceptance, Microcal recognized the market potential of this program and agreed to a general release. The product, called Origin, was so successful that a separate company, Microcal Software, was formed in 1992 under Yang to continue its development and marketing.

I joined Microcal Software with the understanding that I would use my technical skills by working in product development while at the same time assisting the marketing department to gain a better understanding of the product. This was probably the ideal entry position for someone with my background, since it allowed me to contribute while permitting me to learn how the business was being run.

Into marketing

My first job was to develop analysis utilities for Origin, but within six months I had begun to work with the marketing department. My initial assignments in marketing were to help publish a newsletter and write marketing brochures, but I soon became deeply involved in the problem of how best to communicate the benefits of our product to prospects and customers. Before long, I had taken on most of the responsibilities of the marketing manager, a position that was vacant at the time.

Since I had set up automated measurement systems at the University of Maryland it was easy for me to understand data analysis and graphics software products. Indeed, I would say that "insider" understanding of technology markets is one of the assets science Ph.D's offer technology-based companies. As I talked to customers, I realized that they saw our product quite differently from how we saw it. As a company run by technical people, we had focused on adding advanced features to the product. Our message to prospects stressed the unique technical capabilities offered by Origin.

But technical support calls and an informal survey indicated that these advanced features were of interest to only about a fifth of our customers. Responding to a formal survey, our customers stressed that they had purchased Origin because it allowed them to create technical graphs more easily than the competition's product.

The survey led us to reformulate our marketing strategy. We redesigned our software demonstration and all of our marketing materials— brochures, advertisements and press releases—to emphasize "ease of use." At the same time, the Internet gave us a new means of reaching customers. A World Wide Web site (http://www.microcal.com), opened in October 1995, has provided us with a relatively inexpensive way of doing business, putting us on equal footing with larger competitors for the first time. Currently, almost half of our prospects visit the Web site, and many visitors download the software demonstration, saving us tens of thousands of dollars in processing and mailing costs.

I also learned that most of our prospects knew little about the specialized analysis and graphics software packages available in the market, and that their expectations were based instead on tools in spreadsheet programs such as Excel or Lotus 1-2-3. Using the skills I had acquired during graduate school, I began to write and publish articles on topics such as why one needs specialized software for analysis and how to select the software best suited for one's environment. To increase brand-name recognition, we developed customer application stories, describing solutions to analysis and graphing problems in particular industries, which we placed in trade magazines. In the process of educating our customers, we also enlarged our customer base, drawing in people who previously had been unaware that there was specialized software for their needs.

The emphasis on ease of use also prompted me to take a close look at our product line. When I joined the company, it was producing nearly a dozen different software modules. Many of these had been developed in the early days of the company with the goal of bringing in additional revenue. As Microcal grew, however, these products became a drain on rather than an asset to the company. Salespeople had to become familiar with each product, which also had fulfillment costs—for marketing materials, order taking, packaging, and accounting. We were losing money on some of the products and, even worse, diverting attention from our core products. By eliminating some products and consolidating others, we reduced our line to a few products that appealed to more than 90% of our potential users. Nor did we neglect traditional sales channels, such as direct mail.

The advantage of direct mail over advertising, which the company had previously emphasized, is that its efficacy can be measured. Different messages can be tested by sending different mail pieces to the same list, or different markets tested by sending the same piece to different lists. After initial setbacks, our direct mail efforts have been very successful in increasing revenue.

Conclusions

Paradoxical as it might seem, I am using my scientific training to advantage in the position I now hold. The past two years have tested my intellectual mettle as much as did graduate school. I am still an experimentalist, but my experiments now involve real-world problems that do not have tidy solutions, and they must be completed more quickly. The lifetime of an Origin version is about a year, and it is getting shorter; sales and marketing strategies must therefore produce results in just a few months. Moreover, competition among software companies is as tough as among academic scientists, perhaps tougher. The work is challenging, the stakes are high, and the job is rewarding.

I would say that someone with a Ph.D. in the sciences is often better prepared for a career in a technology-based company, particularly a small start-up, than the average business major. Why? Because it's generally easier for a scientist to grasp how a business runs than for a business major to understand a highly technical product.

Young physicists considering a career in business might begin by reading the National Academy of Science's *A Student Planning Guide to Careers in Science and Engineering*, which can be found at http://www.nap.edu.readingroom/books/careers/, or by visiting the National Reasearch Council's Career Planning Center for Beginning Scientists and Engineers (http://www2.nas.edu/cpc).

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