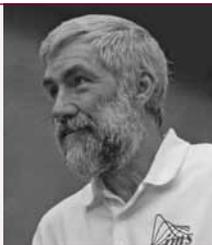# Terence's Stuff: Give Industry a Chance

All Terry Speed is saying is, "Give industry a chance". . . If you are in academia, as most IMS members are, have *you* considered alternative careers?

What do people promoting data science and big data want that we statisticians do not seem to have? Why do so few PhD candidates build their theses around a specific application? Why do so many of our PhD grads want to be professors? Why don't more PhD students in statistics do internships with industry over their summers? Nothing is simple with questions like these, so my initial answers to these questions are bound to be simplistic, probably wrong-headed, and definitely tendentious, but let me give them anyway.

One thing I notice about discussions of data science and big data is that they are invariably in the context of specific application areas. Global change, brain signals, earthquake signals, supernovae, social unrest, traffic accidents and smart thermostats are all named on the website of the Berkeley Institute of Data Sciences, part of a three campus $38M initiative launched by the White House in November last year, to be housed in the University Library at Berkeley. One thing I notice about discussions of mathematical statistics is that they are rarely in the context of a specific application area.

Recently I talked to participants in a Mathematics in Industry Study Group (MISG) and to students at an Industry Doctoral Training Centre (IDTC), both in Australia; to postdocs at a US academic institution who are struggling to maintain—not to mention further—their careers there; and to a scientist from a small, successful US company keen to employ statisticians or statistics interns. I found some common themes in our discussions, including the perennial "applied"-vs-*applied,* and academia-vs-industry divisions. There was also a general feeling that these issues do not get as fully discussed as they should in academia, where most of us reside.

When writing about factors motivating the first Australian Mathematics in Industry Study Group, 30 years ago, one of the organizers remarked that he had attended an applied mathematics conference at which just two or three of the 120 delegates were from industry, and only about 20 out of 56 talks had specific applications in mind, i.e. were really *applied*. In part, the MISG was started to change this, and it has been very successful. I wonder what proportion of the statistics talks at a typical IMS conference are *applied*, in the preceding sense, and whether we need an initiative to change this? My feeling is: possibly.

The Industry Doctoral Training Centre seeks to bring together an industrial problem and an industry sponsor with a PhD student and an academic advisor. This seemed a wonderful program: industry gets problems solved, while the students not only get something with direct real-world value to work on for their PhD, they develop communication, teamwork and leadership skills, as well as immersing themselves in the subject matter of their problem. I heard that finding industrial problems and students wanting to work on them was not as hard as finding suitable academic advisors.

Chatting with people, some of whom were on their second or third postdoc, about the difficulty of getting research grants or tenure-track academic jobs, I couldn't resist asking them how seriously they had considered other careers. How would they like a job, I asked them, which didn't require

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applying for grants, which permitted them to work reasonable hours, paid well, and was enjoyable, challenging and fulfilling? Sounds good, was the response. There are plenty of such jobs outside academia, I told them. They freely conceded their value system had probably been skewed by their long sojourn in academia, and by their respect and admiration for their advisors, and that their belief that academic jobs were the best by far was not necessarily based on complete information. It's my impression, I told them, that professors are very good at helping students develop into people like themselves, often many more than could reasonably have a career like them, even if that was desirable, but less good at pointing to or promoting alternative careers. That, I said was up to them to explore. In a better world, their advisors would be well informed and be able to discuss a broader range of futures with them.

What should be done? Stat department chairs could establish or strengthen existing links with industry, strongly encourage all grad students to take summer internships, ensure that they all know about careers outside academia, arrange adjunct appointments for interested and suitably qualified people from industry, and encourage their faculty to become involved with industry as well, for example via sabbaticals or summer internships. Then we might hope to see more grad students working on statistical problems from industry for their PhD research, something which would serve the triple purpose of solving an *applied* problem of real interest and perhaps importance, familiarizing themselves with a field other than statistics, and broadening their career opportunities.

Win, win, win.