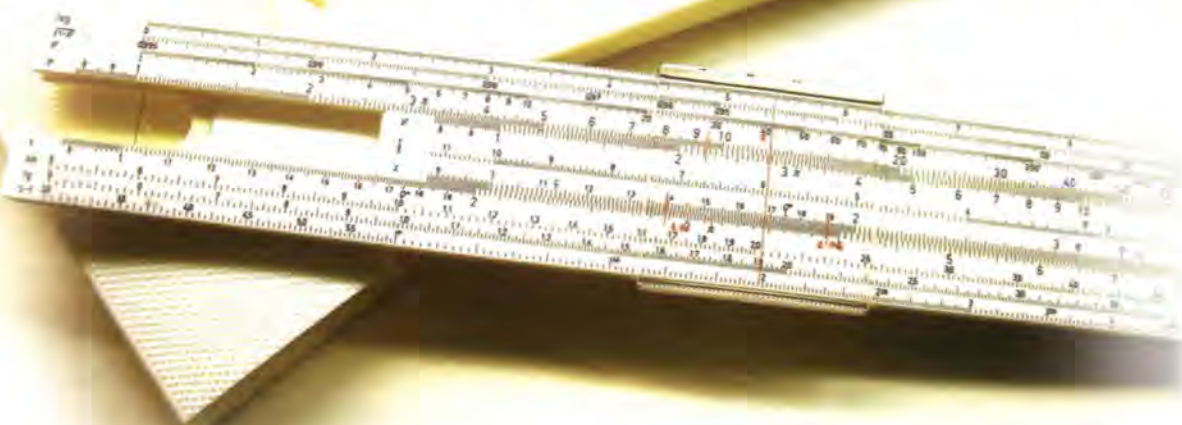


Actuarial (R)evolution



During the past several decades the actuarial profession has been transformed by a combination of technological advances and social changes. Gone are the days when actuaries could focus entirely on mathematics or learn most of what would be required to practice by studying for examinations. Students entering the profession today will require a broad skill set that will need to be refreshed throughout their careers.

This point was driven home to me recently when I mentioned to a young actuary that I used a slide rule in high school. She gave me a puzzled look and asked what a slide rule was. For anyone not old enough to remember the days before calculators in the 1960s, slide rules were used for multiplication and roots.

By the time I was hired as an actuarial trainee in Maryland, slide rules had been replaced by calculators. My first boss gave me an expensive Hewlett-Packard calculator, a pad of huge green accounting sheets, a pencil and a big eraser. I spent hours frantically calculating column upon column of figures for things like loss ratios by auto-rating territory. If he changed one selected factor I would have to manually recalculate hundreds of numbers.

In the mid-1980s technology appeared that worried many actuarial students more than the boss changing a selection: personal computers and Lotus spreadsheets. It is hard to imagine today but some actuarial students feared for their jobs, wondering if there would be any work if experienced actuaries could push F9 and do in a millisecond what it took an hour to do by hand.

Of course, such concerns were ridiculous. The computer revolution certainly transformed actuarial work, forcing us to master complex software and make sense of enormous amounts of information collected in insurer databases. Technology liberated actuaries from the drudgery of being human calculators to focus on higher-order thinking at all levels of experience. Reports of actuaries' demise were indeed premature, provided that we were willing to abandon our slide rules and big erasers and embrace spreadsheets and the delete key.

Another abrupt change occurred in the early 1990s. In this case, it was triggered by an unwelcome visitor named Hurricane Andrew, which came ashore in South Florida and exposed the fact that actuarial techniques relied upon for decades to compute rates and measure exposure to extreme events were deeply flawed. Across the world actuaries began to reassess how to measure risk from earthquakes, cyclones and other catastrophic events. Once again, technology played a critical role, as advances in computers allowed firms like Applied Insurance Research and Risk Management Solutions to build sophisticated models capable of simulating the effect of huge disasters on millions of properties.

Actuaries faced several challenges with the advent of computer models. First, most of our previously-accepted methodologies for computing rates and probable maximum losses had to be reassessed. Second and more important, we had to rely on advanced expertise from other disciplines, such as meteorology and engineering, which was built into the 'black box' models. Third, we had to explain all of this to stakeholders.

The rapid retooling of catastrophe risk management and ratemaking highlighted the critical role communications play in

actuarial work. Actuaries had to explain to a skeptical public why our traditional methods were lacking and why we should now be trusted to get it right using newer technology. That technology forced us to develop communications skills in order to work with experts in other fields, such as seismologists. We had to explain actuarial techniques to them and understand their disciplines. We then had to communicate how we used that complex science, often outside of our traditional expertise, to the public.

2001 saw the terrorist attacks in the United States, where a handful of deranged individuals triggered an enormous loss in a way that was not previously considered in setting rates or assessing risk. Once again, the profession had to communicate difficult concepts to the public, such as why terrorist attacks may not be insurable in the private market and why government participation is often required.

The 2003 outbreak of SARS also reminded us of the exposure to pandemics, which can have huge implications for life and health insurers. SARS and 9/11 showed actuaries that we face exposures that may not be clearly reflected in historical data and that require us to think in ways not explicitly taught on the exam syllabus.

There were also several large insolvencies in this period, including HIH in Australia, that triggered an intense process of introspection within the actuarial profession and by regulators. The result was a much greater role for actuaries in the solvency monitoring process. In Australia, valuations and financial condition reports require actuaries to write complex documents explaining insurer operations to management and regulators. Once again, calculation had to be augmented with communication.

Another example is the shift from defined benefit (DB) to defined contribution (DC) retirement plans. There are significant differences in risks to individuals from these models; DB plans offer a degree of predictability in retirement that can be lost in DC plans. Actuaries have played a valuable role in communicating the consequences of various retirement funding options to the public.

One can draw several lessons from examples such as these. Actuaries should:

- **Expect the unexpected and prepare for 'unknown unknowns'.** External shocks, demographic shifts and technological change have and will transform the work we do in unpredictable ways.
- **Reach out to other professions and learn about technology in related fields,** such as building a skill base in earthquake science to prepare for running catastrophe models.

- **Make communications an integral part of both basic and continuing education.** Almost all of the examples cited in this article involve actuaries having to communicate with outside stakeholders.

The Institute has created a 'Communications Toolbox' on its website to help members improve communications skills (see <http://www.actuaries.asn.au/communicationstoolbox.htm>). It has sections on presentation skills, written communications skills and case studies on effective communication.

While no one can be sure what challenges will face us in coming years, two issues are likely to surface. One is climate change. While arguments continue over the details, there is a growing scientific belief that human activity is affecting the Earth's climate. At a minimum, this is likely to amplify the uncertainty associated with forecasts of extreme weather events that drive property insurance markets. The Institute has been proactive in this area, having offered two submissions to the Garnaut Climate Change Review.

Another issue may arise from technology-driven advances in the resolution of data. Actuaries are gaining access to huge troves of data, including geo-coded location information showing properties' exposure to flooding, genetic testing revealing a person's exposure to disease, automobile 'black box' data recorders showing driving habits and financial databases showing details of individual spending patterns. High-resolution data may challenge actuaries with conflicting goals of making use of the best information and maintaining 'fairness' in rating by pooling high- and low-risk exposures into broad risk pools.

When we reflect on the changes that have happened over the past 20 or 30 years, it is clear that at the time most were unforeseen, whether the trigger was the advancement of technology or unimagined events. Events in the future are likely to take us equally by surprise.

Actuaries possess a dynamic skill set and have the discipline to continually hone their expertise through both formal continuing professional development and other technical training. Actuaries have moved from being 'technical people who know about risk and insurance' to 'risk and insurance people who know a lot technically'. That shift requires us to become integrated with the business that we are in and to possess the ability to communicate our technical expertise in ways that other professions and the public can easily understand.

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