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Applying maths to the real world

At high school and college I completed the advanced level maths and in the science field I did physics, which I really enjoyed even though I didn't pursue it later. I also did some computer studies, which has helped me a lot with the grunt work in mathematical modelling. I have always liked maths and science because you generally know whether you are right or wrong, as opposed to an English essay or history essay where you're voicing your opinions and trying to get an argument across.

During high school I did the mathematical high school challenge and generally scored fairly well. I also did a week's study experience at the Australian National University, learning more about physics, which was enjoyable.

In Years 11 and 12 I studied economics, which I really enjoyed. I thought I would like to follow in that path, so my economics teacher suggested actuarial studies, which is more on the financial side of economics. It incorporates maths and statistics, modelling the probability and risks associated with both general insurance and life insurance. Consequently I did a degree at the Australian National University in Canberra.

My interest in mathematics came from the more applied side of it. There's a problem there – we need to estimate it or solve it or model it – and I've really enjoyed using the mathematical and statistical techniques to actually answer problems and solve problems and apply it in the real world.

A cadetship at ABS

I went through an actuarial economics degree at university, but I wasn't sure what I really wanted to do. After four years of uni I really wanted to get out and get some work experience and see the world. I applied for jobs for graduate positions in private institutions such as banks and PricewaterhouseCoopers, and in government institutions such as Treasury and the Australian Bureau of Statistics. It was hard trying to study and do all those applications!

It came down to a choice between a private enterprise, which offered me a job, and the ABS, which offered me a cadetship, so I asked what a cadetship was. You basically came into the Bureau and worked for four weeks in January, and then they paid for you to complete honours the next year and guaranteed you a job when you finished. Well, that sounded fantastic! So I completed honours, and I've worked for the ABS now for a year and a half on a range of different projects, and I've really enjoyed it.

I work in the Analysis Branch in the Methodology Division, which applies complicated analysis to ABS data sets and writes reports and theoretical papers. The aim is to find better ways to provide information to users and to improve statistical methods.

If I hadn't gone down the maths/stats path, my next preference probably would have been to go into computer science and programming – but I didn't want to be stuck in front of a computer all day. I found the maths and stats gave me a good grounding to pursue my career aspirations in management and leadership.

A wide range of work experience

I worked all the way through university and through Year 12 as well. My first job was working at Hungry Jack's. That was good experience in how to motivate yourself and how to work with other people and motivate others. Also I did some very useful leadership training through them.

Later I worked in local government as a disabilities respite worker and then a disabilities respite coordinator. That gave me a good understanding of client services and office work. A lot of the people I was working with had no other chance to get out of the house to meet their friends or to go away on holidays – often families were living close to the borderline financially. Dealing with the families was a real challenge but also rewarding. We took people on trips to the snow, to the coast, and to the Dubbo zoo. The highlight was a trip to the Sydney Paralympics, with a group of about 10 people.

Now, at the Bureau, I have a personal interest from my previous experience working in respite care. There was always much more demand than we could meet, and it was always hard lobbying for money. So it's really good now to come in from the other side and, given the vast data that the ABS has, to give numbers to the disabilities administrators so that they can hopefully make an objective decision.

I've also worked as a volunteer – I'm in the volunteer fire brigade, which I've been in for eight years now. And I'm now a deputy captain and assistant training officer, and I've found that's been really good in developing the leadership and teamwork skills, working with people in a highly stressful environment.

Estimating disability

On a typical day I normally get in by 8 o'clock – that ensures I get a free car park! Then I generally check the emails and get up to speed with what I have to do for the day. I'm working on two different projects at the moment, so there's generally at least one work group meeting or team meeting. I'm also supervising two graduates who have come in this year. So a typical day will involve chatting with them and making sure they're okay with the work they're doing.

A particular project I'm working on at the moment is small area estimates of disability for every local government area. We do a survey every five years that collects national estimates. That provides statistics on physical disability, intellectual disability and so on Australia-wide. State administrators want to have this information at the local government level so that they know where the demand is greatest and how their services are meeting the demand.

My role is to build a model based on this national survey and then to apply this model to the census data to provide estimates for each local government area. It's really interesting work, and you can't get access to this data anywhere else but the ABS.

The research is looking in particular at what model will give the most accurate estimates from the data for use at the small area level. Do we look at the person-level model – such characteristics as whether a person's disabled or not, employed or not – and apply that to the census data? Or do we use area-level data, since we now have the disability rate and also other area characteristics such as the number of people receiving the disability support pension? This is a challenging project, and I like being able to lead it.

I hope our work benefits the average Australian in that we are better informing the community. Specifically, we're hoping to get the best possible estimates out to the disabilities administrators so that areas with a previously unrecognised high disability rate will be able to get some additional funding.

Daily work and career aspirations

Then I also have my own work, which is a range of statistical analysis using SAS or another analysis program, writing up reports or journal articles, or preparing a presentation for an internal seminar or an external conference, such as a recent social policy conference in Sydney. I'm also the health and safety rep for our area, which involves making sure that everyone has a usable workspace and is not likely to be injured.

I co-wrote a paper with some people at the Bureau of Statistics in Adelaide for a social policy conference on children's participation in sport. They did the survey and collected data, and I did some more complicated analysis using logistic modelling, which identified some of the key drivers associated with participation and non-participation in sport.

It was really interesting to find that the data actually showed somewhat different outcomes than the expected ones. For example, state administrators thought that computer games would have the largest effect on children participating or not participating in sport. We found that although it had an effect, it was relatively low compared to what the parents did – whether both parents were employed or not employed – and whether they lived in areas of high social economic advantage or disadvantage.

I enjoy the opportunity to absorb some of the knowledge and technical know-how of more experienced statisticians. I'm working with my supervisor, who's been in the Bureau of Statistics for 15 years and has extensive experience in a lot of different statistical methods, so it's been a real challenge to learn from him. I've learnt a lot about the theory and how to apply it, and using different non-standard statistical programs to actually apply it. But when you finally get out the results and they're a vast improvement on what's been done previously, it's a real sense of satisfaction.

I'd like to be more involved in a management leadership role, and I found that the maths and stats gave me a good grounding to hopefully pursue my career aspirations upwards in leadership. I've also found the maths and statistics analysis side has allowed me to interpret problems and deal with problems in a more analytical way, and I've found that helpful in other areas outside the statistical analysis area.

Away from the office

Besides being in the volunteer fire brigade I like playing tennis and watching my girlfriend play hockey. Also we've recently bought a house, so a lot of weekend time is spent on chopping down trees, painting and learning how to be a handyman. I'm not a natural at this, but I'm having fun learning.

I think I probably look at life through an analyst's lens, in that when I see a problem I naturally try to break it up into segments, such as the process I've just gone through in buying a house. It was a big and scary commitment with all the issues involved, but I found I broke it down into parts – such as how much money we've got, how much we're earning, how much we expect to earn, is it value for money, is the house in good condition compared to a lot of other houses. I find I tick the boxes and make sure I'm doing everything right and everything's complete.

I've found that's really helped both in work and in doing things personally. I might not find the most creative way, but it's very efficient to break a project up into segments and complete each task.

On the creative side I like playing the piano from time to time. I used to play the piano all the way through high school, but time commitments meant I couldn't continue the official studies. I like getting some music and playing that and occasionally jamming with my brother, who's a much better musician than I am.

I like reading science fiction and fantasy books. I find I'm not reading as much as I used to, since I'm looking at numbers so much during the week. But I do enjoy having the weekends free to get out and do things.

A commitment to the fire brigade

At the moment it's quite easy to work because I don't have any kids. The Bureau of Statistics is really good in allowing you to balance your home and work life, and sometimes when I have to help look after family members, it's not a problem to take the day off and work at home. My girlfriend works at the Bureau as well, which makes it easy to car pool – except when one of us wants to stay late and the other wants to go home. The biggest challenge I've found is balancing the volunteer fire brigade life and home life.

The time commitment to the fire brigade varies according to what is going on. During the winter, the off season, we have regular training. There are also training activities that go

over a weekend about once a month. Last summer was really quiet, so we trained just one weekend a month. When there's a very hot fire-ban day, we'll take an afternoon off work and 'stand up' at the shed, ready to go. And then we have really busy times like January 2003 – when, incidentally, I was doing my four weeks of work experience at the ABS. That was really challenging for me: I'd just started a new job and wanted to make a good impression, but I had to take off my third day there to go out and fight the fires. And then I was taking probably every second day off the job to be out there. It was a highly stressful time.

If there is an emergency, the Bureau of Statistics allows me to go as soon as I'm needed. If you have to take a day off to do something else, the job's still there when you come back. You have time pressures to produce your work, but if it gets delayed by a day everyone understands and there's no blame or problems.

Why be a statistician?

If I had to describe stats in one word, I'd say 'challenging'. All the different stats techniques are challenging, too, but what I find most interesting is the applied side: 'This is the raw data, which doesn't mean anything by itself. This is the question, the problem. How can we best get the information out of the data to answer this question? What tools can we use?'

I enjoy being a technical statistician to research and analyse the data to come up with solutions and present them to the customers or the clients, to inform them where their data agrees or disagrees with what they believe and to assist them in better understanding their information. Sometimes, though, it can be a challenge to explain the technicalities in a way that people can understand. And actually influencing decisions can be a real challenge, which is why in the future I'd like to have more of an applied/leadership role rather than stay in a research/informing role.

I'd definitely recommend a career in mathematics and statistics, as there's plenty of job opportunities out there. There's massive amounts of data out there that companies and governments want to use to improve their decision making, and they need people who understand maths and statistics. That can apply to anything from the Bureau of Statistics data to tax data and social security reporting. And in the private sector people are always looking at better marketing strategies, sales responses. Credit card companies need their data analysed for fraud. Same with banks. They're trying now to identify fraud risks and to understand their data much better.

A lot of my friends at uni have moved into the government sector area as well, including the tax office and the department of tourism. Some are using their analysis skills, and some have moved more into corporate services, into leadership roles.

Other friends have moved into the private sector and followed the actuarial career path. Although their pay might be slightly better, they are having to work really hard for their money. Some have really long hours, 70-hour weeks. But they are getting similar

opportunities to me and are able to use their skills in a really good analysis way. I've noticed there's been a real demand for analysis skills and statistical analysis skills, so all my friends haven't had a problem getting a job.

If I were to give careers advice to people in high school or university, I'd say Talk to your maths or economics teacher about what units to study, what career paths there are. Look around and pick a good university, because that's going to be your home for the next four or five years. Get the best possible education and knowledge to apply for graduate positions.

Also get some good work experience. You can start anywhere, perhaps at the local fast food place or in a local government agency. Unfortunately, a part-time job can cut into your weekends, but (a) it's good for the bank balance, and (b) it's good experience in working with other people, working in teams. I really find people who have had some work experience to back up their university knowledge really have an edge when it comes to interviews and getting a job and a career further down the track.