

OCCASIONAL ADDRESS

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Delivered at the graduation ceremony for graduates from the Faculty of Engineering

Great Hall, City Campus, Wednesday 10 May 2006 at 2.30pm

Chancellor, Vice Chancellor, Faculty Deans, UTS staff, guests and graduates.

First, heartiest congratulations to those of you graduating today. You have completed a rigorous degree in one of Australia's, arguably one of the world's, great technical universities. You are embarking on a career in which the discipline and, I hope, the passion for this most honourable calling of engineering will serve you well. While rejoicing with you today I would like to ask you one question: "How may we better communicate the engineering message?"

In the forty years since I completed my engineering degree at the University of Western Australia using a slide rule, log tables and occasionally a mechanical calculator, the tools available to us have multiplied. Working first in telecommunications, then information and communications technology, I am the first to embrace the mobile phone, digital camera and internet, along with the products of Mr Gates and Intel. But I learned more from the great engineers I've been privileged to work with than from either the web or even (whisper it quietly in this company) my professors.

My first boss was a wise old Scot, David Abercrombie, Chief Engineer at the Overseas Telecommunications Commission (long since absorbed into Telstra), who claimed that an engineer needed to assume only two things – the constancy of the velocity of light, and the permittivity of free space. From these he claimed one could derive all other laws.

But he had an even more potent message, insisting that "an engineer must first and foremost be a gentleman, which I define as a person who does not make unnecessary work for his staff" (with no apologies for the sexism inherent in the language of the 1960s – it's hard to believe looking at the graduates here that the first female engineers in Australia only graduated in the middle of that great decade!). I've always regarded this as a test of anything I've set people to do, or of those who have set me time and effort-wasting tasks.

In my ten years in Papua New Guinea during the transition from an Australian colony to an independent state, I led teams installing microwave stations, telephone exchanges and cable across the land. I had assembled the 1969 works programme containing about 500 projects for another Chief Engineer, Tom Pearson. Before looking at my pages of figures, painstakingly compiled with the help of a mechanical adding machine, Tom thought for a couple of minutes and estimated that the work

would come to “about 6.3 million dollars”. I was astonished – his estimate was correct within a couple of percent. The power of the ‘gut feel’ or the back of the envelope calculation to confirm the (obviously essential) detail is even more important today when the often spurious precision of a computer can mask horrendous errors. So it’s a great discipline always to ask yourself and your colleagues, “Does this feel right?”

Not all wisdom is to be learnt from fellow engineers. After PNG’s Independence I worked as Director of Telecommunications for Kaibelt Diria, the Minister for Public Utilities. Kaibelt was a traditional Highlands village leader with seven thousand coffee trees that kept him rich and seven wives whom he claimed helped balance that out. I had to brief him, in Melanesian Pidgin for the next day’s Cabinet meeting, on the relative technical, economic and political merits of a submarine cable versus a satellite earth station. Kaibelt became frustrated at the complexity of the arguments, saying that he would never understand and that he was thick and stupid.

Horrified, I countered that, as Minister, this was just not allowable and that, if I was explaining it badly, he must send me away and I would find somebody who could do better. He refused, saying in pidgin “*het bilong mi pen tumas, nau mi laik drink bia*¹”. We consumed a slab of lukewarm South Pacific lager and went over the cable versus satellite arguments another fifty times. Sitting in Cabinet at his elbow the next day I could not have been more delighted to hear Kaibelt say, with great conviction to the Prime Minister Michael Somare and Minister for Finance Julius Chan, “*Ceibol bilong mi em i nambawan samting*²”

It occurred to me then, and many times subsequently, the importance of communicating our complex messages clearly to people who have no technical background or training. And it reminded me of the truly disgraceful advice contained in the Engineers’ Song of the University of WA in the 1960s. After extolling feats of engineering excellence starting with Roman roads, the chorus proclaimed lustily:

For it is now as it was then
The engineers they knew things,
We are the big strong silent men (sic - regrettably accurate then, see earlier comment)
Who do not talk but do things.

OK, it distinguished us from the lawyers who we all knew did nothing but talk, but it completely denied our ‘mission to explain’.

¹ Pidgin is a pleasingly phonetic language and reading this passage out loud should reveal the meaning. If not, a liberal translation is: “This is giving me a headache – let’s have a couple of coldies.”

²Again liberally: “This submarine cable which I fervently support is something the country really needs, a number one idea!”

For the last couple of decades I've worked with the Arup Group, the consulting engineers for the Sydney Opera House, Centre Pompidou in Paris, the HSBC headquarters in Hong Kong and, perhaps more modestly but just as importantly, many of the buildings at UTS. The firm's founder, Ove Arup, studied not engineering but mathematics and philosophy. A construction contractor for many years, he had got tired of receiving designs from consultants that could not be built so, at the age of fifty, he set up his own consulting firm in London. Ove coined many memorable sayings. One of the wisest and most startling was that "Engineering is not a science". It is worth quoting in full:

"Engineering is not a science. Science studies particular events to find general laws. Engineering makes use of these laws to solve particular problems. In this it is more closely related to art or craft; as in art the problems are under-defined, there are many solutions, good, bad and indifferent. The art is, by a synthesis of ends and means, to arrive at a good solution. This is a creative activity involving imagination, intuition and deliberate choice."

You cannot teach imagination and intuition any more than you can teach that other essential, passion; but you can exemplify them.

In concluding, I want to return to my theme of communicating what engineers do. When we met in the 1980s my wife Margaret knew all about what architects, social workers, doctors, artists and lawyers did; she had never to her knowledge met an actual engineer. We've both always loved buildings and, over a period of years, Margaret came to recognise the hand of Arup's engineers in the steelwork of, for example, many of the Darling Harbour buildings. It then occurred to her that, looking out any window, every single thing that was not living (and quite a few that were) had the hand of an engineer writ large in its design and construction. Margaret then could not believe that we as a profession are so little known, asking "Why don't you tell people what you do?" "Because we're big strong silent men," is not a satisfactory answer.

So my message is to go out and be heard; and do it in some unexpected places. Today's ceremonies opened with a very proper acknowledgement of the Guring-gai people of the Eora Nation, upon whose ancestral lands the university sits. Rather than simply recognising this I would like to challenge you to go further. For those of you who stay in Sydney, could find out more about the Eora people, how engineering is serving them, how it could do better and what part you might play. Those of you who move elsewhere in Australia can do the same with the traditional owners of the land where you live and work; those who work overseas will have no shortage of people to contact. And to communicate the potent and infectious message – engineering is a fine, useful and honourable calling. If done properly it is also great fun!

So again sincerest congratulations on graduating - I wish you all well in your careers.