Re-setting science and innovation for the next 20 years

Drawing it together

Discussant Murray Bain*

Colin James and I drew lots as to who would speak first and as usual, the fourth estate gets the last word. But this is great timing for me as the recently appointed chief executive of the new Ministry of Science and Innovation. I congratulate the organisers who have so presciently figured out this would be a very good time to get some stuff on the table about science and innovation. Today has been a very useful one for me but there's always the challenge, isn't there, of drawing it together. Colin will do that much more succinctly than I. However, I've got a few thoughts that I'm interested in sharing with you.

First of all, as always when you're drawing together sessions from a conference there are a lot of disparate views so you're not going to get one coherent view. The second point is that you bring your own prejudices to what you're hearing and so you tend to shut out stuff you don't like the sound of and you really focus on the stuff you do. So I've tried not to do that. The new Ministry of Science and Innovation is about to commence shortly, so I know that there are going to be lots of notes taken on what I say, but you should treat this as just preliminary thinking. I'm not going into this job with a whole lot of pre-formed ideas.

This conference has been a really useful starter for me but as usual one needs to introduce a bit of a balance. So if I talk about the common themes I've heard it will be just that. One of the things that's come through clearly to me is the tyranny of the word 'or' compared with the power of the word 'and'. We hear 'or' in lots of debates in science because a lot of the stuff that is important ends up as a balance of views. We end up saying you can't go to one extreme or the other – and that's very true. There has been certainly very common alignment expressed today on the importance of innovation. However innovation is one of those words that we instinctively know, but when we're asked to actually put a meaning to it, it's quite difficult to do.

One of my Swedish counterparts talks about research as being 'the conversion of money into knowledge' and innovation as 'the conversion of knowledge and competence into money'. Now that's a Swedish kind of comment whereas in New Zealand what we'd do is replace the word 'money' in the second bit with 'value'. That allows us to talk about environmental and social research as well as simply economic research. So we talk about innovation as converting knowledge and competence into value. I think it's a very succinct and important way of talking about the topic.

I thought there was common agreement today that our quality of life is very dependent on many factors – economic, environmental, and social but each faces many threats. Economic – low-cost manufacturers around the rest of the world. Environmental – we've got climate change and water issues. Social – we've got the ageing population. There was also general agreement that innovation and the conversion of knowledge and competence into value is a key to addressing those threats.

Also there's a strong recognition that the science system is absolutely crucial to achieving innovation. Listening to the speakers it's clear we need the whole innovation chain working well. Innovation and science, as many have said, are part of a process as well as a journey and we all need to work seamlessly throughout. It strikes me that language is really important. Sometimes we talk about basic discovery science and relevant strategic science as being an either/or. But as Sir Peter Gluckman said we have applied science and not yet applied science. Both fit on the innovation chain, starting at basic and going all the way through to application – they are all part of the same innovation chain. I think convergence of these ideas has been a big thing here.

Secondly, there's room on the innovation chain for a range of differently skilled people. We may need a better balance along the chain but importantly we don't claim that the term 'excellence' only applies to one part of it. I hear and understand worries that basic science may become undervalued as the world swings to an outcomes focus. We know that we need high-class people right along the innovation chain, from basic science moving right through into value. We know that globally we will only be respected if we have high-class people. We will only have access to other world-class scientists if we have quality to offer them back. The message is one of ensuring quality right across the innovation chain.

However, the most important thing that's come through is an underpinning one – it's about the need for us to do things

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together in partnership. We've talked about the Finns – they've been living in the shadow of the Russians for many generations and they've learnt that working together is the only way to survive. In New Zealand, the stars are aligned at present. I'm seeing a mood in companies to get closer to research organisations and our universities, CRIs and other research organisations to think about outreach. So if I'm prepared to commit to anything for the new Ministry it will be about working in partnership. Partnerships with government agencies; partnerships with industry; partnerships with our universities; our CRIs and our other research organisations. And utilising the high-class scientists that we have right across our system to create a truly smart New Zealand with a really high quality of life.

Discussant Colin James*

I am not a scientist. My last formal brush with science was in what was then called 6A (now the seventh form) with Sears and Zemansky. For a decade and a half the *New Scientist* has been the most expensive periodical I buy but scientists tell me that is populist pulp.

Nevertheless, science - or, more correctly the research, science and technology part of innovation - is one of the very few biases I allow myself as a political journalist. That is because over 20 years governments have negligently underfunded science and innovation generally.

I note that a number have said in this conference that science is only one of the enablers of innovation (which is improving efficiency and prosperity through a wide variety of big and small ways). That will complicate policymaking and the role of scientists. I liked Jacqueline Rowarth's quote of Peter Housden's quote about effective alliances between small organisations and entrepreneurs (the 'bees') and big organisations (the 'trees').

I take an interest in science because it represents, reflects, replicates, replenishes, and refashions the beatific and barbaric in humans. Science both is an ennobler of humans and reflects humans' unique nobility among species, that is, the capacity to modify the environment to enhance prosperity.

So we get more prosperous on science. Being prosperous doesn't mean just more dollars and more self-gratifying things. It means longer and easier lives, better in a wide range of material and non-material ways. Conversely, science also both corrupts humans and reflects humans' unique ignobility among species, that is, the capacity for destruction. So we get more endangered on science. Science enables us to kill and maim other humans more efficiently. As a species we have delighted in that killing.

Science has also enabled humans to exploit, distort, kill and extinguish other species. As a species we have delighted in that to the point where we may have so perverted and degraded the ecosystems we depend on that we may be endangering our own existence. Sir Peter Gluckman reminded us of this.

This duality of science — reflecting and enabling the good and ill in humans — has engendered ambivalence about science: it is seen as serving good and ill, imaginary and real in both cases. This helped stall genetic modification in this country and is also a major element in the anti-nuclear policy. This ambivalence and suspicion has been compounded by the damage done to the reputation of science by shoddy, fraudulent or distorted science and its application (by, for example, pharmaceutical companies). The climate emails and the silly IPCC statement about the retreating Himalayan glaciers have damaged all scientists' credibility.

In other words, as with democracy and capitalism, the most dangerous enemies of science lie within.

Scientists need to find a way of not only of speaking louder and more effectively about the nature and value of science — a theme of this conference, highlighted by Sir Peter — but also to speak loudly about those who degrade science from within. There is a parallel in the advisability that democrats defend democracy and capitalists defend capitalism and do not turn blind eyes to those in a democracy or in the capitalist system who undermine those systems' credibility.

Educationalists generally have a role too, in teaching risk and probability, especially to journalists who see not risk but impending doom and not probability but a proportion.

Next, what is science? Is it physics, chemistry and biology and all the related fields? Or is it also, for example, psychology and rigorous social observation and recording? In that respect I note Sir Peter Gluckman's determination to try to get social policy decisions anchored in science. A topical example is very early childhood intervention to both generate productive adults and save money on prisons, mental health and addiction interventions, and income support.

Dan McElrea pointed us to 'clean-tech' if, as part of an innovation strategy, we are to pick sectoral winners. Some countries

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in the region have decided to do that. Singapore is investing $US700 m; Korea is making $US85 b in loans to companies for strategic research with an emphasis on 'green growth'. Ten months from when he first talked of it, Nick Smith's clean-tech taskforce has still not got past the Cabinet. Sir Peter and Bob Frame, among others, highlighted the limits to growth in the traditional GDP sense.

There is also matauranga māori. Yes, there is a distinct Māori knowledge from observation and use (examples are medicaments, aspects of environmental guardianship, ecosystem interactions). But is there a distinct Māori way of acquiring and developing new knowledge? If so, does this rank as equal to the scientific method? Garth Harmsworth addressed that, but I think there is a rigorous debate yet to be had on it.

Next comes money, which has been a pervasive theme at this conference.

Struan Little took us back in a time capsule to 1985. He said: 'Public investment in science only yields benefits when its output is applied in the economy'. He said: 'It is all about growth.' He said: 'It is going to come down to funding'. And he rammed home a theme of budget constraint. That is, science is up against greedy baby-boomers demanding their superannuation.

He wanted a shift from blue skies science to applied science. That focused us on a theme of commercialisation. I will leave that aside, except to note that when it fell behind on the science, Nokia fell of a cliff two years ago. Struan did refer to the science system being about 'other outcomes, too, such as environmental, social, health'. But those outcomes would not be funded under his criteria because they are 'other' outcomes, not economic ones.

I think Struan's criteria miss two points: One is serendipity. Would Sir Paul Callaghan have been funded in his early stages if a strict economic criterion had been applied? Yet his research has spun off a range of small, high-tech companies. If the Government were to put real funding for the Global Research Alliance into animal methane research instead of the miserly $10.5 million a year, it might yield some interesting unexpected outcomes. And those would be ours, because it is our project — well, half ours and the risk is the Dutch half might be better funded and get more of the spinoffs.

The second point strict economic criteria risk missing is the unmeasurable social benefit from the exploration of ideas that cannot be directly applied to economic output; a better thinking society, with a better thinking elite, is likely to perform better economically — just as a cohesive and valued workforce is likely to be more productive and to come up with small innovations in the way they work and thereby become more productive still

That highlights a wider benefit, which James Renwick touched on: prosperity in its widest sense, a better and longer life. The important point in Struan's paper is that that is the way most of the Cabinet instinctively thinks and Bill English thinks in particular. GDP is everything and too much spending is inimical to GDP growth.

But here comes Tonto: Wayne Mapp stated that: 'We are going to have to make the same sort of investment as our comparator countries.' He mentioned Queensland and Singapore, to which you might add Korea. Wayne has made John Key aware that Singapore and Korea are at or rapidly approaching 1% of GDP government funding. As Linda Sissons pointed out, New Zealand government spending is well below the OECD average of about 0.65% of GDP. I note in passing, from conversations I have had, that companies probably spend more than they report so the Inland Revenue Department doesn't stop them expensing it.

Will John Key get Wayne's message? He could get to 1% with five annual injections of $200 million new spending in science and innovation. He has made some encouraging noises, very recently. He also says New Zealand is not a command and control economy like Singapore, which he admires, implying he can't just order up a bold innovation strategy and expect the people to fall in behind. But a leader with a high positive rating and acceptability could lead if he chose. (And if he stopped reading focus group reports. He once said polls are 'scientific'. They aren't – and they look backwards.)

That brings me to another theme of this conference: collaboration and getting to scale by collaborating internally and externally. Sir Peter took us down that track with his comment about science and diplomacy. I note that the world is economically and digitally and increasingly socially interconnected. I note the Philip McCann thesis, which implies size and I note Rod Dunbar's 'corridor conversations'. Then I note New Zealand's very small size. As centres for innovation go, Auckland is small and dysfunctional.

The alternative to finding a way to get to scale is to live in Tom Friedman's 'flat' world where wages are increasingly set internationally: a recent American news article stated that United States call centre wages are the same as in India. Of course, call centre wages are relatively high by comparison with other wages in India and relatively low by comparison with other wages in the United States. But it is not a comforting future for those who don't fit in the innovated world or who live in a country which undervalues innovation, as New Zealand does.

We could do some innovative thinking about all that. There might be a way to connect effectively, if we go to the title of this conference: the next 20 years. Looking out 20 years is hazardous: in 1910 no seer could have predicted a devastating world war, the rise of communism, the transformative impact of electrification, the discovery of penicillin, and the splitting of the atom, and a spectacular financial crash – all disruptive events. There will be disruptive events in the next 20 years: water, food, China-US, energy crunches, all the progeny of the marriage of nanotechnology/genetics or biological storage of information.

How about 10 million people here by 2030 instead of 5 million? So the next seminar might explore some scenarios for the next 20 years.

And a final point, with which I concur: Jacqueline Rowarth invited us to 'value the wayward thinker'.