



Australian Government

Chief Scientist

Cranlana Alumni Speakers Series

20 minute keynote address followed by 40 minute Q&A

The Future is a Serious Business

27 May

6:45 pm

62 Clendon Road, Toorak

In the wake of the federal budget, there is a lot of talk about the future – indeed we are told often that we have to think not of ourselves or our own self-interest, but of the nation’s interest – and that of our children and grandchildren.

Now that might be easier for some than for others.

If, for example, I were a public servant aged 40 with the actual responsibilities that I had when I **was** 40 all those years ago (one income, a wife and three children, a mortgage and nothing in the bank), I might find it difficult not to worry about what was going to happen to me and mine.

But that is not actually me, so I don’t have to drag myself out of my own fog of selfish introversion.

Instead, I can turn to thinking about the sort of country that we want to build.

And I wonder.

What will be the character of our Australia by, say, 2025?

Will we have the foundations for sustained economic growth? Will we build a country that will be socially, economically and culturally wealthy? One that is confident about its place in the world? And secure, with a healthy population?

Will we support a fair and just society? Will we use our prosperity to ensure that the circumstances of an individual’s birth do not, on their own, determine their life’s outcomes? Will we give people a real ‘fair go’ - not something that is a dim memory of a bygone era brought out from time-to-time to make us feel good.

So yes, I **am** one of those who think that the big aspiration we have for our country should drive our policies and that our

economy should be tuned and adaptable enough to support the achievement of our aspiration.

So yes, I **am** in favour of identifying the sort of future we want – the big aspiration for the country; and then I am in favour of designing our policies so that when they are implemented we have a much better than even chance of the country turning out the way we want it to.

I do understand the need to balance the budget. But within that context I believe aspiration should drive the economics, not economics limit the aspiration.

And yes, I do know that whatever we aspire to now will need to be adaptable because we do live in a world, and we are connected to it, and what happens in it will influence what we can do and what we can become.

But we are smart enough to do it; we just need to want to do it.

And I am not sure that we do.

I have two problems with the way the current conversation is framed.

The first is that we seem to assume that the future will be largely the same as the present.

Just as our Constitution contemplates an army and navy – but not an air force - we seem to find it difficult to talk about jobs and employment in prospect.

Let me illustrate – when a year 10 student is choosing a science-loaded or a non-science loaded study option in year 11 and 12, their choice will influence what they can do if they opt for further study. It would be hard to take on a technical trade or certain university courses if they hadn't taken some science at school.

There is, however, a commentary going around suggesting that too many are choosing science-based study at university, because some four months after graduation there are some people still seeking employment, especially in professional areas.

Leave aside the fact that they might be choosing to study what they are interested in, the 'too many' argument relates to the jobs now and the employment now of people who had to make a key decision in 2006 or 2007.

The reality is that our year 10 student won't finish school and a course of further study much before 2020. And if Australia is like most other growing and transforming economies in the world, then we, too, will need increased numbers of science, technology, engineering and mathematics graduates and trade-skilled people by then – and in the years beyond.

In other words, the study choices of year 10 students in 2014 will influence the skill profile of Australia, from 2020. It is a long pipeline and the prudent would **not** be encouraging young people to shut their eyes to the reality of change.

Indeed, they might go so far as to suggest that leaving the fate of our skills base to the choices of 16 year old students, without any attempt at incentives or direction, is irresponsible in the extreme.

Take Agriculture, for example. In the last budget, the Commonwealth's contribution to the cost of an Agriculture degree was reduced. If the universities are even to keep the same *per capita* income as before, the cost to the student would need to rise by some 37%.

But Australia has just this year signed trade agreements that include increased Agricultural exports to our partners. Enrolments in Agricultural Science have essentially flat-lined

since 2001. So from 2016 we will put up the price to the student when we didn't need to, and probably shouldn't – in the nation's interest.

The second problem is that we tend to think about the future in only the narrowest terms.

We all agree that our children would want us to be robust fiscal managers, but we don't speak as often about the other things that they might like as well.

- Breathable air, for example.
- A flourishing planet.
- Oceans they can swim in, and fish they can eat, like we can.
- Meaningful occupations.
- An accessible education system for all, that offers them choice and provides the knowledge and skills that they will need as they adapt to the changes in their immediate world and the world around them.

As I say, the future is bigger than the forward estimates; and far more difficult to put on a spreadsheet.

That is not to say we cannot measure, model and plan for the sort of world we might want, factoring in the things that make life worth living, and leaving enough flexibility to adapt to change.

This is something that business understands, just as much as any science appreciation society in the country.

Outside of the laboratory, the most sophisticated forecasting tools and the most evidence-based approach to risk are often found in the corporate sector.

Consider the report released last week from Lloyds of London.¹ This report is about one of the most contentious issues of our time: climate change. But it does highlight an approach to risk from which we can all learn – especially those who would prefer to sit on their hands and wait to see the horse bolt before they get up to close the stable door.

The report from Lloyds begins simply enough:

“Scientific research points conclusively to the existence of climate change driven by human activity.”

It goes on to describe how actuaries can set about translating the work of climate scientists into profitable business models.

This process is called ‘cat modelling’ (‘cat’ being a friendly actuarial way of saying ‘catastrophe’).

We read that this modelling is:

“an integral part of any organisation that deals with natural catastrophe risk, and used most commonly to perform activities such as risk selection and underwriting, design of risk transfer mechanisms, exposure and aggregate management, portfolio optimisation, pricing, reinsurance decision-making and capital setting.”

Lloyds urges insurers to keep pace with the climate science, so they can make sure their portfolios are suitably optimized for all the storm surges, hurricanes and floods ahead.

¹Lloyd’s, *Catastrophe Modelling and Climate Change*, May 2014
<http://www.lloyds.com/~media/Lloyds/Reports/Emerging%20Risk%20Reports/CC%20and%20modelling%20template%20V6.pdf>.

The credit ratings agency Standard & Poors released its own report last week, ranking the vulnerability of 116 countries to climate-related risks.² It notes:

The evidence suggests that it is probably safe to expect that for most national economies, other things being equal, climate change will negatively impact national welfare and economic growth potential.

Observations corroborating this expectation could lead Standard & Poor's to lower sovereign ratings on the most affected sovereigns.

I could translate the meaning into many fewer words, but I will leave theirs to speak for themselves.

That says to me that the business world appreciates that it has a vested interest in understanding the state of the planet.

And the same careful, methodical, far-sighted approach is taken to all manner of risks.

- The risks of skills gaps in the local workforce.
- The risks of underinvestment in public infrastructure.
- The risks of widespread science illiteracy.
- The risks of a declining stock of human knowledge and capability.

All of these things are carefully measured by well-paid people, so that even better paid people can use the knowledge to prepare their pre-budget submissions.

The question then becomes how business leaders choose to act on what they know.

²Standard & Poors, Climate Change Is A Global Mega-Trend For Sovereign Risk, May 15
https://www.globalcreditportal.com/ratingsdirect/renderArticle.do?articleId=1318252&SctArtId=236925&from=CM&nsi_code=LIME&sourceObjectId=8606813&sourceRevId=1&fee_ind=N&exp_date=20240514-20:34:43

- Do they seek to change the future – or do they adjust their assets assuming disaster?
- Do they step up as leaders of progress- or do they just stand witness to a collective mistake?
- Do they make the case for science and evidence – or do they trade on ignorance instead?

The quick and easy answer is that every board is beholden to its shareholders, and every company must maximize its interests.

But we are deluded if we believe that every business can build its own private ark to rise above the tide.

I am obviously thinking here again of climate change.

As Paul Polman, CEO of Unilever, said recently: *Left unchecked, climate change has the potential to become a significant barrier to our growth strategy, and that of just about every other company.*³

But I am also thinking more broadly of the role we assign to science in society – and what we do to make sure our science enterprise is ready for the needs of the future.

I want to urge you to take an interest in Australian science policy – or rather, Australian science funding and what it is funding.

³<http://www.unilever.com/mediacentre/pressreleases/2014/UnileverCEOcallsfordecisiveactiontotackleclimatechange.aspx>.

We are one of only three nations in the OECD which lacks a national plan on science, technology, engineering and mathematics.⁴

I think that should trouble you.

We ought to be able to agree that science, technology, engineering and mathematics will be central to our destiny as a nation.

The ‘fuel’ for technological growth is ideas - new knowledge. Without it, we will never make the leaps that we need to make; our leaps will be shuffles – small, incremental and not often detectable in a reasonable timeframe.

It is important to note along the way that if we don’t replenish the stock of intellectual capital all we do is deplete it.

And when that happens, our culture is diminished along with our collective capacity to adapt, or mitigate or even to solve the challenges that lie ahead.

Perhaps you think the pay-offs on national science investment are too long-term and intangible to be taken seriously.

The truth is, of course, you use the pay-offs from science every day.

Almost every component in the Apple iPad can be traced back to public science investment – from the microprocessors to the touch-screen to the battery.⁵

The fact that the translation takes time – what we call the lag effect – makes it all the more critical for government to lead the way.

⁴ Organisation for Economic Cooperation and Development (OECD), *OECD Science, Technology and Industry Outlook*. 2012, Directorate for Science, Technology and Industry..

⁵ Mazzucato, M. (2013). *The Entrepreneurial State: Debunking public vs. private myths*. New York: Anthem Press.

In a celebrated letter to President Clinton in 1996, America's top corporate leaders wrote:

*History has shown that it is federally- sponsored research that provides the truly 'patient' capital needed to carry out basic research and create an environment for the inspired risk-taking that is essential to technological discovery.*⁶

We need that wisdom in Australia, too. The patient capital is a means by which we keep connected with the rest of the world as it develops new knowledge and as we contribute, it is how we keep talent in Australia and it is how we manage to adapt and to apply knowledge and ideas to new products and services.

Of course I am not suggesting that we in Australia can replicate the levels of spending that are possible in other countries.

I *am* suggesting that we cannot expect to prosper with a withered sense of what Australia can and ought to be.

The good news is that we have good science, good potential and many opportunities – plus the need. We have the capacity to make a worthwhile contribution to the sum total of global knowledge and harness the knowledge that others can contribute in turn.

The less good news is that we do not seem to regard this as a high priority.

Our science historically has been the victim of on-again, off-again policies, too often short term, too often based on terminating programs; and when they are on, they are not necessarily connected to all the other elements that make science strong.

⁶ Congressional Record (1996) Volume 142, Number 139 (Tuesday, October 1, 1996), <http://www.gpo.gov/fdsys/pkg/CREC-1996-10-01/html/CREC-1996-10-01-pt1-PgE1888.htm>

Last year my office put out a position paper, calling for a strategic approach to STEM.

The Business Council released its *Plan for Action Enduring Prosperity* on the same day, endorsing this STEM strategy and calling for its implementation.

CEO Jennifer Westacott and I published an opinion piece to explain our shared position:

“There’s no magic pudding to transform us into what we could be. We’re talking about a 50-year agenda founded on Australia’s capacity to innovate, adapt and value-add in traditional sectors, and it starts with a change of mindset.

“The only certainty is that more change is coming and we need to articulate and proceed in preparing for it.”

A good science policy will be a comprehensive science policy. It will start with education, progress through research, cover international engagement and lead to an adaptive knowledge based economy that we will need when the resource boom fades.

It would be above politics and beyond the political cycle.

And it would be strongly supported by the business community that relies so heavily on the benefits that science provides.

For that, our children might really thank us.