Senator Kim Carr
Minister for Innovation, Industry, Science and Research

Address to National Press Club of Australia
"Science Serving Society"

Federation of Australian Scientific and Technological Societies –
Science meets Parliament

Wednesday, 19 March 2008
Canberra

[CHECK AGAINST DELIVERY]

When societies invest in science, they are investing in their own future. They are entitled to expect a fair return on that investment.
They're entitled to know we are using the country's intellectual and technical capacity to deliver outcomes that matter to them – stronger communities, more good jobs, a cleaner environment, better public services, a richer culture, greater security for themselves and their children.
Everybody here knows the rules of professional scientific conduct – think independently, put emotion aside, reject received authority, be faithful to the evidence, communicate openly.
These are good rules – rules I wholeheartedly endorse – but there's one more I'd like to add – remember your humanity.
Remember you're part of a wider society – one that you have a special ability and therefore a special duty to serve.
This doesn't just apply in the physical sciences, but in the humanities and social sciences as well. When I say science I mean knowledge in all its forms.

Safeguarding research freedom

What kind of environment do we need to nurture creativity and propagate new knowledge?
The answer is simple – an environment of freedom.

Freedom produces the best research, and our best chance of getting the outcomes we want from our scientists is to jealously safeguard that freedom.

The first hundred days of this government show just how seriously we take this. During that time we have:

· ended clandestine political interference in Australian Research Council grant allocations

· given the research community a voice in ARC strategy and governance by establishing a new advisory board

· started negotiating charters that will guarantee the professional independence of public research agencies like CSIRO

· abandoned the half-baked Research Quality Framework and begun work on a smarter, fairer and more rigorous quality assurance regime called Excellence in Research for Australia

· earmarked funds to get universities going on improving public access to publicly funded research

· and flagged our intention to enlarge the chief scientist's office and make the position full-time so the next incumbent can be a champion of science and research in the community, not just an adviser to government.

It's early days, but we've already made huge strides.

We relish debate and welcome the contest of ideas. We count on our scientists and researchers to improve our decision-making by sharing their expertise. Creativity and dissent are critical to the innovation process.

Many here will be mourning the loss of Professor Peter Cullen, who died last week.

Peter put it this way: "Committed and knowledgeable scientists can make a contribution to public policy if they are prepared to speak out."

After a decade of intimidating political correctness, many scientists have lost the will to speak out. It's essential that they find it again.

The James Cook effect

The last thing we should be doing is closing off options, rejecting possibilities, making arbitrary decisions about what can or should be known.

The early Nobel prize-winner Albert Abraham Michelson is best known these days for one notorious pronouncement.

In 1903 he said: "The more important fundamental laws and facts of physical science have all been discovered, and these are now so firmly established that the possibility of their ever being supplanted in consequence of new discoveries is exceedingly remote."

Two years later, Einstein published his special theory of relativity.

We should be wary of repeating the Michelson fallacy, and more cautious still of people who take it for truth.

That includes the modern pundits who keep telling us that ideology is dead and history is over.
Believe me, history is just beginning.
There's so much we have yet to learn – about what lies beneath our oceans, about the nature of the universe, about what makes us human.
That's why we defend scientific freedom and that's why we support basic research – especially pubic benefit research.
This is where discovery begins.
Think about James Cook.
He set sail on the *Endeavour* to observe the transit of Venus in Tahiti and take measurements that would help astronomers determine the scale of the solar system.
He went on to survey the east coast of Australia. This wasn't what he came for. It was a collateral benefit of curiosity-driven scientific research.
You never know what you will find until you look.

The challenge

Given science's tremendous capacity to meet human needs and fulfil human aspirations, it's worrying that our recent record in the field is mixed.
We should all be proud that Australia produces about 3 per cent of the world's scientific papers with just 0.3 per cent of the world's population.
We should be less proud that our total expenditure on research and development as a share of GDP was just 78 per cent of the OECD average in 2004-05.
What these two statistics suggest is that the outstanding work being done by our scientists is not having the impact it should beyond the academy.
This was confirmed recently when Australia was ranked last out of twenty-six OECD countries for research collaboration between industry and universities, and second last for research collaboration between industry and public research organisations.
You can see the same disconnection in the labour market. Australia has only eight PhDs per thousand in the workforce, compared to eleven in the United States, twenty in Germany and twenty-eight in Switzerland.
And if we don't act now, things will get worse. The 2006 *Audit of Science, Engineering and Technology Skills* concluded that Australia was heading for a cumulative shortfall of 19,000 scientists and 51,000 engineers and engineering tradespeople by 2013.
After growing by 9 per cent a year in the eighties and early nineties, the number of students starting research degrees has flat-lined over the last decade.

Why innovation matters

The fact is that Australia's innovation effort has failed to keep pace with the rest of the world.

But why should we care, and what can we do about it?
In part, we care because innovation – new ideas and new technologies – will enable us to meet environmental and social challenges.
Whether it's climate change or homelessness, we need new ways of doing things, and that's what innovation is all about.
We also care because innovation drives productivity.
As Australia's recent experience shows, when you neglect innovation, productivity growth goes backwards. Ours has been below par for the last five years. It was zero in 2007.
Australian business groups, supported by the OECD, have been stressing the link between innovation and productivity for a decade or more.
While no one disputes this link, some argue that governments don't need to foster local innovation because the globalised market will enable us to buy all we need from overseas.
But without high-tech, high-value exports of our own, how do we pay our way? Without sustainable, competitive, knowledge-based industries of our own, how do we stay in the game?
In the rough and tumble of global commerce, some countries forge ahead, some catch up, some fall behind.
If we want to forge ahead, we must – as Kevin Rudd likes to say – make our own luck.
In fact, the more exposed countries are to international competition, the more they rely on local innovation to create competitive advantage.
It doesn't always matter where the innovation comes from. What matters is how quickly you adopt it, how widely you diffuse it, and how cleverly you apply it.
But there's the rub … Unless you have the skills to create new-to-the-world innovation, you won't have the skills to adopt and adapt. The two go hand in hand.
If Australia is to prosper, we need to strengthen the institutions and skills that underpin innovation. We need to harness creativity wherever we find it.

The national innovation system

People started talking about national systems of innovation a couple of decades ago.
A few of Australia's sharper thinkers took up the idea, including Dr Terry Cutler, who is chairing the innovation system review I launched in January.
A few politicians also cottoned on.
John Button was years ahead of his time when he added technology to the industry portfolio in 1984.
Steve Bracks showed the way in Victoria when he appointed Australia's first Minister for Innovation in 2002.

The push for an integrated approach to innovation stalled when the past triumphed over the future in 1996, but I'm determined to crank it up again.

That's why we established the Department of Innovation, Industry, Science and Research.

The first thing you should notice here is that innovation comes first – it's the portfolio's unifying idea, the air that we breathe.

What we've done in this portfolio is identify the public and private sites where new knowledge is born and brought them under one administration.

Australia spent $15.7 billion on R&D in 2004-05. The split was 54 per cent business, 27 per cent university, 10 per cent federal government, 6 per cent state government, and 3 per cent private non-profit.

Bring together industry, science and research, and you bring together the bulk of our national R&D effort.

So much for the structure. What about the functions?

In the issues paper it released last month, the national innovation system review panel suggested an innovation system must be able to identify opportunities, generate and distribute knowledge, mobilise resources, manage risk and provide infrastructure.

That's the capability we've set out to build, not only in my portfolio, but across the government – especially through the broadband and education portfolios, which are addressing Australia's digital deficits and chronic skills shortages.

In my own portfolio we will be doubling the number of Australian Postgraduate Awards for PhD students – that's an additional 1,600 stipends for researchers-in-training each year.

We are also funding 1,000 Future Fellowships for mid-career researchers. These are worth up to $140,000 a year plus $50,000 to help the host organisation meet costs related to the fellow's research.

We are already investing heavily in the physical and human resources needed to power the national innovation system, and we will continue to do so.

What we need now is your ideas about how we can finetune the system to achieve the best social, economic and environmental outcomes for Australia.

But be warned – Dr Cutler and his colleagues on the review panel aren't wasting time. They called for submissions last month, and they've just completed a series of consultations that took them to every state and territory.

The deadline for submissions is the 30th of April, so if you want to have your say, do it now. The panel will complete its deliberations and report to the government by the 31st of July.

Internationalism

The government's response will come later in the year, but I can tell you already it will contain two things – policies to encourage local originality and diversity, and policies to encourage inward technology investment and transfer.

The international dimension is critical. Australia may well produce 3 per cent of the world's scientific papers, but that means 97 per cent are produced elsewhere.

We need international cooperation to access that knowledge and create global solutions.

Australian researchers already work with collaborators in at least 114 countries. Last year, 58 per cent of the papers published by Australian scientists were the product of international partnerships.

We recently became the first associate member of the European Molecular Biology Laboratory, a facility dedicated to basic research with a staff of 1,400 scientists drawn from 60 nations.

Research institutions here will be able to establish EMBL partner laboratories and exploit local strengths, especially in applied life science, to realise shared research goals.

Still in Europe, Australia is getting in on the ground floor of the Seventh Framework Program for Research and Technological Development, the EU's main instrument for funding research. It is worth 53.2 billion euros and will run from 2007 to 2013.

During the first year of Framework 7, Australians were involved in 169 research bids, forty-three of which have so far been successful.

The successful projects cover fields such as health, energy, nanotechnology, transport, the bio-economy, nuclear research and infrastructure.

When I met with the European Commissioner for Research earlier this month, I signalled our desire to dramatically expand Australia's participation in Framework 7 in the years to come.

But while we are keen to rebuild relations with Europe after a decade of neglect, our outlook is global.

Australia now has scientific cooperation agreements with more than thirty countries, including the emerging giants, India and China.

The government's Australia-India Strategic Research Fund supports joint projects between Australian and Indian institutions. Projects funded to date cover everything from biotechnology to advanced materials.

Research cooperation was top of the agenda when I met the Indian Minister for Science and Technology in Melbourne last month.

Partnerships with China include the Australia-China Centre on Water Resources Research at the University of Melbourne, which is supported

by both governments and which promotes collaborative, multi-disciplinary research in both countries.

We went into the last election pledging to "Make Australia's innovation system truly international, by supporting partnerships, collaboration and foreign investment in Australian R&D."

We are already delivering on that pledge, and the best is yet to come.

Square-kilometre array

There is one very special international project I can't leave out, and that's the square-kilometre array.

This is a $2 billion radio telescope that will be fifty times more sensitive and 10,000 times faster than anything we have today.

The design hasn't been finalised yet, but the SKA will be a vast network of radio dishes with a combined surface area of a million square metres – or one square kilometre – arranged in clusters extending up to 3,000 kilometres from a central core. If we get New Zealand on board, that could be 5,000 kilometres.

Its development is being backed by a consortium of forty-six institutions in nineteen countries, including CSIRO and the Australian government.

Six countries put their hands up to host the telescope, and in 2006 the International SKA Steering Committee short-listed two – Australia and South Africa.

The proposed core site in Western Australia has unique technical advantages, but the committee also said Australia as a whole has two big things going for it.

First, "A well-developed community of radio astronomers with a strong history of scientific discovery and technological innovation."

And second, "A technologically sophisticated society with extensive engineering capabilities and wide experience in international partnerships."

Australia's leadership in astronomy is indisputable. We publish well over 4 per cent of the world's papers in space science and those papers have a huge impact, being cited 38 per cent more often than the world average.

CSIRO is making good progress on a prototype telescope called the Australian SKA Pathfinder which will demonstrate our capabilities and be a significant achievement in its own right.

I lobbied hard for Australia's bid in Europe earlier this month, and I'll be doing the same at the International SKA Forum in Perth next month.

Why is it so important? Why should working families care about a big telescope in the Western Australian desert?

To begin with, the SKA will generate huge spin-offs in supercomputing, fibre-optics, non-grid and renewable energy, construction and manufacturing over its fifty-year life.

The array will generate 200 gigabytes of data every second. The ICT requirements will be huge.
The computer needed to process this data hasn't been developed yet. The SKA will make it happen.
It will drive innovation across Australia and build capacity that will benefit the entire research community as well as industry.
It will intensify international collaboration and create high-skill, high-wage jobs for half a century.
And then there's the James Cook effect – the collateral benefit no one was looking for, the unexpected opportunities blue-sky research like the SKA can create.
Technologies developed by and for astronomers are now being used to diagnose and treat cancer, scan luggage at airports, track ice bergs, identify crime suspects and monitor climate change.
They're being used to map genomes, analyse the performance of car engines, develop vaccines, mine databases and interpret stock markets.
But I think it's a mistake – and a bit insulting – to assume people are only interested in utilitarian outcomes.
Murdoch University marine ecologist Brad Norman and his colleagues have modified pattern-matching software developed to help astronomers interpret images of star-filled skies.
Norman is using the software to distinguish individual whale sharks by their spots. His aim is to understand and protect this magnificent species.
Most Australians would consider that enough to justify both the biology and the astronomy behind it.
The SKA will give us a window on the birth of the universe. It will tell us more than we have ever known about our place in the cosmos.
At the beginning I said scientists have a duty to serve the community that sustains them.
You can do that by making people richer, or healthier, or smarter, or safer.
You can do it by finding ways to save our fragile planet.
And you can do it by filling people's lives with beauty, hope and wonder.
That's what the SKA will do. It's what so much science does.
It isn't the only reason we support science. It isn't even the main reason.
But it's a very nice bonus.

Media Contact: Catriona Jackson, Minister's Office, 0417 142 238