Australian Government

Chief Scientist

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25-MINUTE KEYNOTE & 10-MINUTE Q&A

STEM EDUCATION CONFERENCE

********** CHECK AGAINST DELIVERY **********

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BALLROOM, RENDEZVOUS GRAND HOTEL, MELBOURNE

I want to talk today about a national STEM strategy, and the outcomes we hope could arise from its introduction.

Education is one of those outcomes, but rather than isolate its importance, I am going to ask you to consider how education fits into the whole. How it interacts, supports and is supported by the other objectives. Let me come back to that detail in a moment.

First though, the case for why we need a strategy.

If you've heard me speaking or read my speeches for the past 18 months, you would know that I am not one of those who thinks that good things will just materialise because that is what has happened in the past.

As I said recently, we need to organise, evaluate and cohere – to make sure that we align our efforts and our investment with our national interests; that we focus on areas that are of particular importance or where there is a particular need; and that we build to a scale that will make a difference both to ourselves and to a changing world.

Other countries are investing strategically in science – for the long haul.

They do not limit their thinking about needs and advantages and focus and scale, as those who use the criticism 'picking winners' do.

Instead of being afraid to be bold, our competitors have moved on.

They have identified national priorities and set out to fund them appropriately – areas where they have advantage, or need, or capacity to grow to scale, or to take new products to market.

The United Kingdom, the EU, Canada, the United States, China, South Korea, and many, many other countries around the globe, have prioritised science funding as an important foundation for future sustained growth.

Amongst others, the UK's Chancellor of the Exchequer George Osborne said in April: *We've had to make difficult choices to cut public spending. The easy route would have been to cut science spending. But it would have been painful for the economy and the wrong answer for Britain. It would have completely undermined our long term economic prospects*.[1]

The key players understand that to have the scientific capacity to meet the greatest challenges, they need to be strategic about the entire pipeline, from education, to research to industry.

So now to some detail of the strategy I will release in full on 2nd September in Parliament House.

It will be underpinned by four main objectives.

- First, **Competitiveness** – science *must underpin a differentiated and readily adaptable economy, one that is globally competitive and one that will enable all Australians to benefit from the opportunities that will follow.*

  We can learn from what has been done in the UK and the US, in particular. There they have introduced structural arrangements that support innovation and ensure that at least a proportion of public money going to private companies is focused on areas where there is need,

[1] Osborne, G. (2014) Chancellor of the Exchequer's speech on science in Cambridge

https://www.gov.uk/government/speeches/chancellor-of-the-exchequers-speech-on-science-in-cambridge

advantage and outcomes which can be taken to market. They encourage linkages between researchers and the business sector. They encourage the flow of ideas and knowledge into new products and services.

- Second, **Education & training** – *we prepare a skilled and dynamic science- qualified workforce, and lay the foundations for lifelong science literacy in the community.*

  There is a national interest and we would do well to remember it. Action in this area will require appropriate co-ordination and cooperation between different levels of government. We can learn from others, including federations, about how to support teachers both in-service and pre-service, and how to use curricula and assessment to enhance learning through inspirational teaching.

- Third, **Research** – *Australian science will contribute knowledge to a world that relies on a continuous flow of new ideas and their application.*

  Like many other countries, we can develop strategic research priority areas – not using all available funding support, and not neglecting basic research that is the foundation of so much knowledge that we can apply. But we can and should align, focus and scale.

- Fourth, **International engagement** – *Australian science will position Australia as a respected, important and able partner in a changing world, for both domestic and global benefit.*

  We should develop strategic government-to-government partnerships that are funded. We should also look to using better the Australian science base and work within our region to establish an Asian Area Research Zone that

facilitates work on shared priorities as well as building infrastructure.

If you are wondering what such a strategy would cost us, the answer is effort, commitment and willpower.

And that means effort, commitment and willpower from everyone here today, as well as many more outside this room.

I am talking about nothing short of changing Australia's culture and for that to happen, we must all play a role.

We do need to be thinking about the role STEM education plays.

We need to be taking measures that ensure our investment and quality control in education will allow us to do all of the things we need to do as a nation. And to do them well.

I noted with interest, comments made by the Prime Minister during a visit to a school in New York a few months back.

A journalist asked: *What can you tell us more broadly about your competitiveness agenda about education and training. More broadly, what will that statement include*?

The Prime Minister answered: *There will be a significant emphasis in boosting our focus on science, technology, engineering and maths because science is at the heart of a country's competitiveness and it is important that we do not neglect science as we look at the general educational and training schemes.*

It is a commendable commitment. Just as we commit to not leaving the next generation in debt, so we commit to securing them a capability that allows them to make their way.

I am equally confident they would prefer to live in a world where people do not die of easily preventable disease; where they have water that is fit to drink and air that is fit to breathe; where science has a chance to change our lives for the better.

They would want the benefits of the knowledge that has taken our species so many thousands of years of failure and frustration to acquire.

They would want the skills to harness that knowledge in practise.

Above all, I believe they would want the capability to take up whatever legacy of progress we leave behind – so that they will know more about the world than we do today; and learn to shape it in ways that we cannot.

Of course that is a mission far broader than a single science portfolio.

Nonetheless, whether it is our climate, our health, our ageing population, our food supply, our economy or our security, it will be scientific discovery and the use of scientific knowledge that forms the core of our ability to respond.

It will take imaginative and curious minds to do that. It is our job to nurture and prepare the minds that we will need.

A few years ago, the Harvard Graduate School of Education released a report *Pathways To Prosperity*.

Its opening paragraph says: *One of the most fundamental obligations of any society is to prepare its adolescents and young adults to lead productive and prosperous lives as adults. This means preparing all young people with a solid enough foundation of literacy, numeracy, and thinking skills for*

responsible citizenship, career development, and lifelong learning.

I agree. And the message doesn't date.

More recently, the Royal Society released a report[2] in which there is a call for a particular focus on science at school.

The Chair of the Committee said *Science and mathematics are at the absolute heart of modern life … (and) provide the foundations for the UK's future economic prosperity.*

The Vice-Chair of the Committee referred to *estimates suggest(ing) that one million new science, technology and engineering professionals will be required in the UK by 2020* and urged Government and the wider education community to take the Royal Society's recommendations seriously.

While the Head teacher member of the committee said *Teaching is a chronically undervalued profession in the UK. Our country's future prosperity rests in teachers' ability to inspire and guide our young people yet we don't currently adequately recognise or reward them. More must be done to enhance the appeal of the profession to prospective teachers and support the important work of those already teaching.*

Are we thinking in these terms? Are we getting ready for the future? Are we really equipping our students for that future? We should. We need to.

I sense that the calls for action are increasing. I sense that our 'she'll be right' attitude might be challenged – and importantly not just from those of us *who would say that wouldn't they* but from others, who need you in this room, to succeed at what you do.

[2] https://royalsociety.org/~/media/education/policy/vision/reports/vision-full-report-20140625.pdf

The Business Council of Australia's President, Catherine Livingstone was recently quoted as saying: *We have been bemoaning the poor state of STEM skills … in schools and universities for over 15 years. If we are all agreed that this is an issue why isn't enough happening?*[3]

And the managing director of Google in Australia Maile Carnegie said: *the long-term challenge for Australia is how do we, as a minimum, keep pace with the global revolution that is happening? But the more immediate challenge is to make sure that we don't slip further behind.*[4]

Comments like these have identified the problem and I agree with them. But I read with interest an editorial in *The Age* last week which talked about the solution.

The editorial described research and scientific work as *infrastructure*.

It said: *it is first a roadmap, and then a road, to a better life for not only Australians, but people everywhere ... it is global in its imperatives. And it is not built, like a stretch of tarmac, in a matter of weeks or months. It takes government commitment and leadership - and time.*[5]

It is a view I have been expressing for years. We can't just continue to tinker at the margins. That's what we have done; look where we are.

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[3] Livingstone, C. (2014) From *Sydney Morning Herald* article "Business Council calls for urgent education overhaul" by Heath Gilmore and Nicky Phillips, July 26, 2014 http://www.smh.com.au/national/education/business-council-calls-for-urgent-education-overhaul-20140725-zvnqh.html

[4] Carnegie, M. (2014) From article *Google chief warns of skills shortages* by Steve Meacham, The Australian, 1 July.

[5] http://www.theage.com.au/comment/the-age-editorial/the-evidence-is-in-science-gets-an-f-20140816-3dtd5.html

I do believe that we need to be bold – well thought through but bold with initiatives that position us well for the future.

At the moment, we have a string of economists who tell us what we can't afford to do; when in fact we need to spell out what we must do and arrange support to achieve our vision. Let's plan, support and prosper.

Again, the Royal Society in its recent report commented*: In science and mathematics there is* ***a fortunate coincidence*** *between the intellectual and cultural needs of the individual and the economic needs of the nation.*

It might be wise to think about what the world ahead will need when our children are ready to lead it. It might be wise to think about what we want for our country. It might be wise not to limit our vision to what the economists of today say we can afford. We need more than that.

And as we do, we might think it wise to invest in their teachers and those charged with educating those teachers.

The first piece of work I commissioned on becoming Chief Scientist was the report *Mathematics, Engineering and Science in the National Interest.*

The report talked about inspirational teaching as the key – both to the quality of our science education system and to raising student interest to more acceptable levels.

As I've said on numerous occasions since, it is time to re-think how we prepare our teachers and how we support them: support to strengthen their content knowledge, to maintain it at contemporary levels and to instil the confidence to deliver the curriculum in interesting and novel ways. With relevant pedagogical development.

Taking natural curiosity and engaging with it in a way that encourages learning of scientific principles requires not just dedication, but a good understanding of education theory and its application.

The then federal government put $57m to support most of the recommendations in the advice.

But the only way programs like this will be successful is for education and science faculties to continue to work together, not just because there's funding available, but because they understand the innate value of this collaboration.

And let's not pretend it is easy. It takes effort, by individuals and institutions, to bring what really seems like a simple experience to fruition.

What we need to do now, is get more individuals and more institutions to do the same. We need scale and we need coordination. And we need it now.

As President Obama said (when he launched the STEM Master Teacher Corps program which had one billion dollars committed to it in the 2013 budget) efforts to improve STEM education are *going to make more of a difference in determining how well we do as a country than just about anything else that we do here.*[6]

That's what's at stake and we can do much better. I hope that we do.

Thank you.

[6] http://www.whitehouse.gov/blog/2012/07/18/president-obama-announces-new-plan-create-stem-master-teaching-corps