Australian Government

CHIEF SCIENTIST OF AUSTRALIA

INAUGURAL NTEU ADDRESS

"Science in Contemporary Australia"

Thursday, 6 October 2011

Law Building, University of Melbourne

MELBOURNE

Professor Ian Chubb AC

Good evening. It's a great pleasure to be with you.

Over many years the National Tertiary Education Union has ardently represented the interests and aspirations of workers in Australia's tertiary sector.

From matters such as university funding levels to academic independence to wage negotiations, there can be no doubt that the Union has been a forceful and persuasive advocate for its members.

As an academic and as a Vice-Chancellor for 16 years I have engaged with the NTEU on many occasions and – I might add – emerged relatively unscathed even after a beer or two with Graham!

Doubtless as you get older, it is easier to remember the good times than the not so good. So I do remember the various negotiations we held about the usual run of issues; but I particularly remember the time I signed an agreement with the Union on a national day of action against Workchoices. It certainly got a run – and I was probably a hero for a day. The Canberra Times ran the story under a headline *Professor Chubb walks alone* with a picture of me walking away from the camera leaning forward walking up a slope; it looked as though I had the weight of the world on my shoulders.

But I didn't. Simply, I felt no need to be told how to employ staff at ANU and what sort of arrangements and conditions we could have for staff.

I should say that I did not once get a call from a Minister or even a backbencher. I don't know what they thought – but they didn't try to heavy me.

But I did know that there would be a financial penalty if I did not offer AWAs. So I sent out an email to all staff basically indicating that I had to offer them an AWA or the penalty would be too costly, that the email they were reading constituted the offer, but that acceptance of the offer was not a condition of employment or promotion at ANU. I think there were two or three staff – a very small number in any case - who wanted and signed AWAs for some personal reason. I should say that I did bump into somebody quite coincidentally who asked whether I took all this seriously enough.

I had. I had done what I had to do; and proceeded to negotiate terms and conditions that were agreed locally and were designed for the circumstances of the ANU and the rest of its staff.

But I am not here tonight to reminisce about the old days as Vice-Chancellor; I was invited here tonight because of my new(ish) role as Australia's Chief Scientist.

I should say before I start that I am often asked about the differences between my ANU job and this job. The obvious ones are that I have $998m fewer dollars to worry about or spend – and about 3,600 fewer staff. Many, many fewer problems you could say. And many fewer negotiations – I have been through my last enterprise bargaining period.

But to come to tonight - as is the case with events such as these, there was some e-mail traffic about the usual things. Particularly there was discussion about the topic of my speech.

Given the absolute importance and centrality of scientific endeavour to our universities and to our world, I considered speaking about some of the big scientific issues such as;

- ANUs latest Nobel Prize winner. Proud of him and pleased for him and his colleagues. Stromlo went through quite a bit after the bushfires and this is a

nice confirmation of what they do and how well they do it.

- Whether Einstein's theory of relativity is really under challenge – whether there are sub-atomic particles that can really travel faster than the speed of light. I should add that of all the emails I get, I have had one or two seeking to persuade me that Einstein got it wrong. Given that there is now work that apparently shows that sub-atomic particles may travel faster than the speed of light, it may be that he did – and it will be fascinating to see the implications of this for science as a whole should the results be replicated, the calculations shown to be correct and the conclusions justified by the results. In other words, when the peer community gets to work to check and cross-check the outcomes.

- Another hot topic - one that does not travel faster than the speed of light - is how we can reduce urban sprawl to create better, more sustainable and more liveable cities. To do this one properly, we need a multidisciplinary approach that puts together the sciences with the humanities and social sciences. Fascinating, important and far-reaching.

- I also thought of a focus on how we can use science to feed, house and care for a rapidly growing global population. We do need to remember that we can't presently feed 1 billion of the 7 billion people on this planet. How will we feed the 9 billion projected for 2050 without science underpinning what we need to do?

There is, of course, any number of really important issues that Australia's scientists are working on. They are issues that will change our world.

And I don't mean science like some people mean 'free speech' – which is apparently a license to do and say whatever you want without regard to facts, evidence or responsibility even if you have the privilege of an audience. I do mean science with proper ethics controls, proper regulation when regulation is proper and licensing when that is proper.

But instead of these, I chose to focus on something else tonight. I plan to speak about:

- The value of science.

- The need for academics to contribute to public debate in their area of expertise.

- The contribution of public institutions to the common good.

- And the importance of intellectual freedom.

These are all really important – and have been for a long time. So long that I thought that the value of science; the value of universities; and the value of academic expression were all battles that were hard fought but won.

It seems not.

Matters which cut to the core of science and which form the very basis of science **and** of an informed, progressive and enlightened society are apparently under siege.

This is disappointing; not to say regressive.

Instead of moving on and discussing things that matter today, and will matter tomorrow, we are caught up fighting a rear guard action against those who seek to question and tear down the very ideals, the values, the principles and the practices of science.

And none of us can be complacent. **All** science risks damage when **some** science is attacked. Today climate change – tomorrow, who knows.

The risk is real because it is the very core of science that is attacked: its principles, its processes, its standards, its ethics and its people. And the scientists are under attack because they get the result that their experiments or observations yield and report things that others don't want to hear.

Climate change is the leading example of this right now. In their 2010 report, the Royal Society captures this point:

"Like many important decisions, policy choices about climate change have to be made in the absence of perfect knowledge. Even if the remaining uncertainties were substantially resolved, the wide variety of interests, cultures and beliefs in society would make consensus about such choices difficult to achieve. However, the potential impacts of climate change are sufficiently serious that important decisions will need to be made.

"Climate science – including the substantial body of knowledge that is already well established and the results of future research – is the essential basis for future climate projections and planning, and must be a vital component of public reasoning in this complex and challenging area."[1]

[1] The Royal Society (September 2010), Climate change: a summary of the science, The Royal Society, United Kingdom

When I quoted the Statement in an article, it was dismissed with a metaphorical flick of the wrist: *'they would say that wouldn't they.*

Despite its inherent rigour and substance, the value, indeed the very integrity of science is being widely questioned. Hardly surprising when you read some of what has been written. If you believed it, you would believe that climate scientists whose work supports the evidence that human activity is contributing to climate change are cheats and frauds and worse. Not just the odd one here and there – but the very many all around the world, and we would have to question why representative bodies such as the Academies of Science and scientific associations issued supporting statements. They are apparently all part of a hush-hush plot aiming to reach the same conclusion whatever the results might show.

But if science and the associated values and institutions we hold dear are under threat – it is not enough to cry foul and lament that 'dark forces' are at play.

We must accept that part of the decline in trust is our fault.

As scientists, researchers and scholars we are the guardians of science.

So if science is not properly valued - part of the problem is that we have not been vigorous or vociferous enough in our protection of it or perhaps more importantly, our communication of it. We need to be advocates.

At the outset let me make my position very clear.

I believe that the very process of science will weed out any falsehoods and any manipulated data and expose those few who engage in such activity. It is in the interests of all scientists for this to happen – so it does. History reveals some celebrated cases where an individual's ambition or obsession got the better of them – and shows how meticulous independent work exposed them.

Thankfully scientists by nature are inherently sceptical. They take little at face value. An article in the New England Journal of Medicine in 1989 included the comment: *"Science is at once the most questioning and skeptical of activities and also the most trusting. It is intensely skeptical about the possibility of error, but totally trusting about the possibility of fraud*."[2]

---

[2] Schechter AN, Wyngaarden JB, Edsall JT, Maddox J, Relman AS, Angell M, et al. Colloquium on scientific authorship: rights and responsibilities. FASEB J1989;3:209-17.

Scientists unpick, examine and reconstruct. They seek to replicate, re-analyse and re-interpret – and when they do, certain directions and conclusions stand the scrutiny and become much more central to our thinking. They are not, ever, immune from challenge – but when an observation has been made and confirmed many times, it can be considered secure if not absolutely certain. When different evidence comes to light, and it stands the scrutiny, it will shift the way we think.

I grew up at a time when scientists were trusted and respected:

- It was a time when there was real enthusiasm for science.

- And it was a time when people were in awe of the outcomes of science, like putting a man on the moon, plastic in our houses and cars and everywhere else for that matter – even in our wallets – being able to see your unborn child using ultra sound, hear again through cochlear implants and manage illness with increasingly effective treatments and drugs.

Nowadays, because its applications are around us every minute of every day, many of us take science – and what

it offers - for granted. So we don't defend it, we just expect it.

And there are now those who – for whatever reason – seek to mock science and scientists in order to instil doubt and fear among the community so that they will resist change when they have to make their choice.

Make no mistake. Our future as a nation, our prosperity, our quality of life and the well being of the entire planet all depend on science.

And as the challenges we face become increasingly complex the importance of science will become even greater.

It also means that scientists will have to deal with the exposure that working on these ever more complex problems will entail. Their very complexity makes them difficult – hard to resolve, hard to articulate, hard to get proposed actions adopted. And the responses to complex challenges will not pass uncontested – nor will they be private. To quote the Royal Society again *'(Climate) science … must be a vital component of public reasoning*

in this complex and challenging area.'[3] Our science will be a vital component of whatever complex and challenging areas we contend with in the future. We will be asking the public to trust us – and there will be those who will argue the opposite.

In an environment where we are asked to take action in the face of '*imperfect knowledge'* it is perhaps not surprising that some science is coming under renewed attack. It has happened before and doubtless will happen again. We saw it with tobacco, initially with the hole in the ozone layer and we see it with climate science.

I suspect that if Copernicus, Galileo or Darwin were with us tonight they would attest to the fact that putting forward ideas which challenge the dominant paradigm will have some pretty serious consequences.

Not always from other scientists in the honoured way: that is using a careful analysis of evidence, challenging it with other, sometimes better, evidence the weight of which might change the way we think or what we think. But sometimes using a belief: the place where evidence is seen **as** unnecessary **as** facts are irrelevant.

---

[3] The Royal Society (September 2010), Climate change: a summary of the science, The Royal Society, United Kingdom

Certainly in the cases of Copernicus and Galileo, they were bringing forward meticulously prepared evidence and conclusions and were pilloried by non-scientists who had a belief – a belief based on no science or at best very little science.

Darwin faced a different battle and was challenged by scientists (and some theologians) of his day. Eventually, his work, his meticulous accumulation of evidence, won over the scientific community. An important part of the 'winning over' was the 1860 Oxford evolution debate during a meeting of the British Association for the Advancement of Science. The Bishop of Oxford argued against Darwin and human descent from apes. And it was here that Thomas Huxley famously retorted that he would rather be descended from an ape than from a man who misused his gifts.

A scientist engaged in meticulous scientific work can alter our world view. They will do so when the work is compelling and when it stands the scrutiny of their peers – not just those who agree to the publication of the work, but all their peers in their specialisation.

For some this can be difficult to accept. If their work is not published there is a conspiracy. If it is published and if it

is criticised, there is a conspiracy. And if it has no impact, there is a conspiracy. The fact is, of course, it might not be any good. I cannot believe that there is a global conspiracy of 'establishment' scientists successfully suppressing results contrary to the mainstream and we don't know about it. Somebody, somewhere would have the evidence – which would be more than a rejected manuscript.

For many in the media and politics and for the plethora of so-called commentators, undermining science is becoming an increasingly popular pastime. We see regularly the contempt directed towards scientists and their findings especially when they say something that some do not want to hear.

And how do we explain why there are many whose views converge? That's easy: there is a global conspiracy – a Group Think - and it's all designed around research funding and travel grants and politics – and, of course, power.

The criticisms come often from those without formal qualifications or training in science. Or those with training in **a** science but not necessarily in **the** science they are criticising.

I have never argued that alternative views to the mainstream should not be heard. I have argued that they deserve the right to be heard if they are views based on evidence derived using a proper scientific process including review. When they are, they face the same consequences. If the conclusions are accepted, they add to our knowledge and may alter what we think. If they are not accepted – they will have been proven useful not because they change the way we think but because they have caused the mainstream to evaluate alternatives. There is nothing wrong with putting forward ideas that turn out to be wrong – they may turn us in new directions. But they are still wrong.

I am told often that ‘non-experts’ have the right to criticise – say climate science. Who would ever argue the contrary?

But let me ask you, if you have a heart attack, would you rush to an orthopaedic surgeon? Or a dentist? Or to anybody who happened to be called ‘Doctor’? Me, for example? Or would you prefer to see a cardiologist – someone who has spent years training to fix failing hearts?

In your condition, you might be happy to have a human being nearby. But if all the above were standing around you, which would you listen to most carefully? I wager that the weight you would give to the opinion of the 'non-expert' would be less. You wouldn't think that balance is equal airtime (or equal column inches); you'd want expert opinion and expert help.

So the weight of the expert's opinion would and should count for more than that of the non-expert – however enthusiastic the latter might be. I suggest that just as somebody called 'doctor' is not an expert in everything, somebody who is able to describe themselves as a scientist is not by definition entitled to represent themselves as an expert in all science. But some do. And they have found that it is easy to use this status to confuse and malign and impugn.

And then there are the entertainers. I won't spend much time on them - just to say it would be good to hear words like 'responsibility' or 'evidence' or 'fact' in the same sentence as 'free speech'. It is clear in a number of our public debates at the moment that saying something, anything that will make a story, is more important than fact.

Defending science can be a challenge because scientists deal in facts and substance:

- They follow the scientific method. The President of the Royal Society, Paul Nurse, has written in New Scientist: "*We need to emphasise why the scientific process is such a reliable generator of knowledge - with its respect for evidence, for scepticism, for consistency of approach, for the constant testing of ideas. Everyone should know and understand why the processes that lead to astronomy are more reliable than those that lead to astrology.*"[4]

- They rely on the application of the scientific method to accumulate evidence from multiple sources often using a variety of approaches. The Nobel Prize in Physics yesterday was awarded to three individuals working in two groups independently and coming to the same conclusion that has stood the scrutiny of peers.

- They rely on review, informed debate and replication to add substance to their work. They make a long-term commitment to evidence-based research,

[4] Nurse, P 2011 "Stamp out anti-science in US politics", New Scientist, 14 September 2011, viewed 4 October 2011 www.newscientist.com

debate, and inquiry. And they follow the evidence trail.

- And when they find a convergence of views at the end of the process they sometimes call it a consensus – a majority view, not a contrived and negotiated view derived from some global pact that remains hidden from all but a few.

And we need to support and advocate that process. We will not be able to do without it yet it could be at risk. The Board of the American Association for the Advancement of Science (an organisation that serves some 262 affiliated societies and academies of science, serving 10 million individuals around the world) released a statement in June 2011 which ended with the comment: *"While we fully understand that policymakers must integrate the best available scientific data with other factors when developing policies, we think it would be unfortunate if policymakers became the arbiters of scientific information and circumvented the peer-review process,"*[5] the AAAS Board says. *"Moreover, we are concerned that establishing a practice of aggressive inquiry into the professional histories of scientists whose findings may*

[5] American Association for the Advancement of Science, 2011 "AAAS Board: Attacks on Climate Researchers Inhibit Free Exchange of Scientific Ideas" 29 June 2011, viewed 4 October 2011, www.aaas.org//news/releases/2011

bear on policy in ways that some find unpalatable could well have a chilling effect on the willingness of scientists to conduct research that intersects with policy-relevant scientific questions."[6] How bad would that be? Can you imagine evidence-free or evidence-poor public policy?

Paul Nurse again: "*It is essential, in public issues, to separate science from politics and ideology. Get the science right first, then discuss the political implications."*[7]

While it may be too early to identify whether the *chilling effect* on what scientists do, has had an effect on the study of science – we do need to know how science is faring in our universities for all the reasons outlined earlier.

I note that one of your campaigns "*What happened to the Clever Country"* which has been running since 2008 highlights that funding on tertiary education has fallen below the OECD average.

Let's look at what this means at a university level in the context of science.

---

[6] American Association for the Advancement of Science, 2011 "AAAS Board: Attacks on Climate Researchers Inhibit Free Exchange of Scientific Ideas" 29 June 2011, viewed 4 October 2011, www.aaas.org//news/releases/2011

[7] Nurse, P 2011 "Stamp out anti-science in US politics", New Scientist, 14 September 2011, viewed 4 October 2011 www.newscientist.com

Some of the basic foundations are in place. For example, Australia's universities enrolled 160,342 (~20%) UG students in science and engineering courses in 2009, 15,812 (~36%) PhD students and employed 6849 (FTE; ~ 25%) academic staff (faculty).

Is it enough? How many are in the courses we need many of them to be in - ones leading to scientific careers - and how many are enrolled in science units because they have to be to get to where they want to go – important qualifications, yes, but not a career in science? For example, we know that some 70% of Chemistry enrolments are in first year. So we know that most are doing first year chemistry because they need some chemistry – not to become chemists.

The questions are obvious; the answers not quite so. By early next year we (OCS) expect to release a substantial report on the state of Australian science - primarily viewed from the supply side – our universities.

Much of the academic profile of our supply side (not all of it) is driven by undergraduate study choices – since substantial money follows where the students go, and what they choose to study. This is a country where freedom of choice is allowed.

But is it in the national interest to leave so much of our intellectual profile to the study choices made by incoming undergraduate students – with a bit of a cross-subsidy on the side where modest funds are sometimes moved from the popular (and important) to the unpopular that are at least as important?

Don't we need a more strategic approach that comprehends that some disciplines are important to Australia (and the world) but not presently popular with students in large numbers? I think we do – and I hope we can make suitable recommendations when we see how the story unfolds.[8]

But some issues are beginning to emerge. If I use Agriculture to illustrate the point; and if we put some of the data from the Excellence of Research Australia alongside enrolment data we get the following picture:

There are 25 institutions that submitted research work in Agricultural and Veterinary Sciences; 13 of these have students at any level enrolled in Agricultural Science coded degrees; 3 have students at the Bachelor, Bachelor honours and PhD level (Uni Melb, Uni Queensland, and Uni Tas); 6 have both Bachelor's and PhD students, but

[8] Professor Ian Chubb's address to the National Science Week Launch Luncheon, 12 August 2011 www.chiefscientist.gov.au

no honours students; 2 have Bachelor's students only; 2 have PhD students only[9]. And the enrolled numbers of domestic students are dropping.

To turn the illustration into a question, is this appropriate for a country that is heavily dependent on our agricultural exports and our agricultural capability not just for ourselves but for our role as a global citizen?

To give that a little context - we now produce enough food to contribute to the diet of some 60 million people; by 2050 our salt-degraded land will have increased from a present 5.7m hectares to 17m hectares. Our already urbanised country (with 90% living in urban settings) will grow to ~37m further encroaching on arable land; and we all know about water and access to it. And as I said before, by 2050 we will be striving to feed 9 billion people when we can't presently feed 7 billion[10].

This is just one example of where we need to be thinking about how our universities can contribute strategically to our national interests – both at home and abroad.

---

[9] Australia Research Council, ERA 2010 National Report http://www.arc.gov.au/era/era_2010/outcomes_2010.htm

[10] Professor Ian Chubb's Address to the AIFST, 20 July 2011 www.chiefscientist.gov.au

It means purposeful change. It means accepting that we can't just continue in the time-honoured ways – however right they might have been for their time.

How?

We have a large investment in our universities (I know many of you might say 'not enough') but what next? To return to one of my pet themes:

We hear much discussion about the importance of innovation as a driver of the Australian economy into the future. Indeed, we have been hearing about it since at least 1990 to my certain knowledge. And we have grown some of that innovative capacity as our universities have added to their own capabilities in order to add capacity to the workforce.

But not enough. From the (oldish) OECD data[11] that I have presently, Australia had some 8 doctorates per 1000 in the workforce. Switzerland had closer to 28. Most of Australia's are categorised as researchers; in Switzerland it is roughly a number as Australia. In other words, a

[11] Source: Auriol, L. (2007), "Labour Market Characteristics and International Mobility of Doctorate Holders: Results for Seven Countries", *OECD Science, Technology and Industry Working Papers*, 2007/2, OECD Publishing. doi: 10.1787/310254328811

country like Switzerland has many more highly qualified people, doctorate trained people, in their workforce than they have operating as researchers.[12] Our employers seem less willing to absorb such people.

But when the resources boom is over, where will we turn? To an innovative workforce driving an economy that can endure? Or the same old, tired ways of doing what the world used to want sometime in the past?

We don't want to go back to what we used to be. We have to change. And our young people and our universities have to be in the vanguard of change.

And if we need science – because we need science - we simply must inculcate the coming generations with an enthusiasm for the wonder, the beauty and the endless potential of science.

Science is awe inspiring – and we need to stir the imagination of our youth so they pursue a career in science or, at the very least, grow into informed decisions makers who have some understanding of science and how it works.

---

[12] Source: OECD (2011), *Main Science and Technology Indicators*, Vol. 2011/1, OECD Publishing. *http://dx.doi.org/10.1787/msti-v2011-1-en-fr*

The time has come to rekindle the excitement.

And there is no shortage of inspiration – the SKA and the Giant Magellan Telescopes, the Large Hadron Collider, the promise of commercial space flights, sustaining our environment and curing diseases and improving health care are all big projects that stir the imagination and reinforce the importance of science to us all.[13]

But there is a lot to do.

The other day I read that a very large fraction of Australian primary school teachers feel unqualified to teach science[14], and that a large fraction of Australian teachers of Year 7-10 General Science had not completed the generally-accepted standard of tertiary education in science[15]. It is hard to encourage people to defend science or not to be afraid of it when from a young age they have been taught by people who are not confident with it.

We simply must do more to support our teachers and more for our students.

---

[13] Professor Ian Chubb's Address to the National Press Club, 21 June 2011 www.chiefscientist.gov.au
[14] International Association for the Evaluation of Educational Achievement, TIMSS 2007 International Mathematics Report: Findings from IEA's Trends in International Mathematics and Science Study at the Fourth and Eighth Grades (2009).
[15] McKenzie, P., Kos, J., Walker, M. & Hong, J., 2008. *Staff in Australia's schools 2007*. Department of Education, Employment and Workplace Relations, Canberra.

And we must also provide careers. It must be said that our structures and organisation were largely designed for a different time. When I was young, one post-doc or maybe two was what you did before you got a job. Now I see young people doing quite a few more than two – and how many of our best and brightest want to hang around hoping that their supervisor will get successive grants so that they can earn; and how many have to delay getting a house or starting a family because of their job insecurity?

One goal in our contemporary context must surely be to work to achieve more secure and more flexible working conditions. We need to facilitate young entrants into the workforce – and into our universities - to make the most use of the talent available.

I think particularly of young entrants into the university workforce, but especially of young women. A study by Australian Research Council in 2009 found that Women constituted 29% of applicants and secured just under 29.5% of fellowships. But the largest number of successful female applicants - 36 of 59 - was clustered in the lowest salary band.[16] It is also obvious that retention of women at senior levels remains poor. Doubtless there are

[16] ARC fellowships 2009-13 www.arc.gov.au

multiple reasons – but the way we work in our universities, the way we judge performance over time and the way we promote staff must be a factor.

I realise that I am preaching to the choir when I say we need to be strong advocates for our universities – whether it is the way we employ staff, whom and how we teach and the research we do. And we need to tell people about it.

Of course it is in this context of greater academic expression that the NTEU has pushed for amendments to the Higher Education Support Act.

The objective is to enshrine free intellectual inquiry as an important principle of providing higher education in Australia.

Intellectual inquiry must always be free and open. It must reflect the disinterested pursuit of knowledge and it must be free to go where the evidence takes it.

To quote again from AAAS '*…we think it would be unfortunate if policymakers became the arbiters of scientific information and circumvented the peer-review*

process,"[17] I add parenthetically, substitute 'entertainers', 'commentators', or indeed 'non-expert scientists' for policy-makers and the hat still fits well.

Freedom of intellectual inquiry is a pretty basic human right and it makes sense that this is enshrined in our universities.

If our universities are to be what we need them to be, they will be out in front: providing thoughtful input to the directions that our society should take. We will use our universities to learn from our past and they will provide much of the wherewithal to ensure a prosperous future – in all senses of prosperous. They will be able to do so by being aware of the public interest but not subject to pressures to conform to a particular view or ideology.

They can do that best when they are free to challenge, and free to extend and stretch our thinking. Free to lead. But fully engaged not aloof from the community that supports them and needs them.

Paul Nurse again: "*It is essential, in public issues, to separate science from politics and ideology. Get the*

---

[17] American Association for the Advancement of Science, 2011 "AAAS Board: Attacks on Climate Researchers Inhibit Free Exchange of Scientific Ideas" 29 June 2011, viewed 4 October 2011, www.aaas.org//news/releases/2011

science right first, then discuss the political implications. We scientists also need to work harder at discussing the issues better and more fully in the public arena, clearly identifying what we know and admitting what we don't know."[18]

It is this benefit, this sequence which flows from our universities, that extends their benefits way beyond the education they offer and the knowledge they uncover. It is this broad role in the community that highlights the absolute value and importance of public universities and other public institutions to Australia.

Support for our great public institutions delivers benefits to our social, cultural, intellectual and political capital. And our economic development.

Without such institutions and without deep intellectual inquiry that challenges us to shape our community, or to reflect on the shape we want it to be, we risk declining into a vacuum where pure economics and individualism are our only values.

Our universities have unquestionably served us well. They will continue to do so – if we let them do what they are

---

[18] Nurse, P 2011 "Stamp out anti-science in US politics", New Scientist, 14 September 2011, viewed 4 October 2011 www.newscientist.com

good at. In turn, they must earn the right rather than presume the right.

I hope I haven't been all gloom and doom tonight. I should conclude by making clear that I am at heart an optimist. I do think that we can make good decisions in this country. I do think that science will play a profound part in our future. I do think that universities will offer education and discovery the best of which is up there with the best in the world. And I do think that universities will adapt their practises to contemporary times. And I do think that all this will be achieved within a value set – with integrity, with standards, with responsibility and with purpose. And I do think that the trust of the public can be retrieved.

And when we do all that well, I am confident that science will continue to bring exciting findings and new technologies to the world.

And with science, the world has prospects. Without it….well, I don't think that is worth thinking about.

Thank you.