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**HOUSE OF
REPRESENTATIVES**

STANDING COMMITTEE ON INDUSTRY, SCIENCE AND
INNOVATION

Reference: Research training and workforce issues in Australian universities

WEDNESDAY, 27 AUGUST 2008

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HOUSE OF REPRESENTATIVES
STANDING COMMITTEE ON INDUSTRY, SCIENCE AND INNOVATION

Wednesday, 27 August 2008

Members: Ms Vamvakinou (*Chair*), Fran Bailey (*Deputy Chair*), Mr Bidgood, Mr Champion, Mr Cheeseman, Dr Jensen, Mr Johnson, Mr Ramsey, Ms Rishworth and Mr Symon

Members in attendance: Fran Bailey, Mr Bidgood, Mr Ramsey, Ms Rishworth, Mr Symon and Ms Vamvakinou

Terms of reference for the inquiry:

To inquire into and report on:

1. The contribution that Australian universities make to research in Australia, including:
 - The contribution of research training programs to Australia's competitiveness in the areas of science, research and innovation;
 - The effectiveness of current Commonwealth research training schemes; and
 - The adequacy of current research training schemes to support Australia's anticipated future requirements for tertiary-qualified professionals in a wide range of disciplines.
2. The challenges Australian universities face in training, recruiting and retaining high quality research graduates and staff, including, but not limited to:
 - Adequacy of training and support (including income support) available to research graduates in Australia;
 - Factors for graduates that determine pursuit of a career in research;
 - Opportunities for career advancement for research graduates and staff;
 - Factors determining pursuit of research opportunities overseas;
 - Australia's ability to compete internationally for high quality researchers; and
 - Whether Australia's academic workforce is ageing, and the impact this may have on Australia's research capacity.

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Committee met at 10.14 am

CHAIR (Ms Vamvakinou)—I declare open this public hearing for the inquiry into research training in Australia being conducted by the House of Representatives Standing Committee on Industry, Science and Innovation. The inquiry arises from a request to this committee by Senator the Hon. Kim Carr, the Minister for Innovation, Industry, Science and Research. Written submissions were called for, and 104 have been received to date. The committee is now conducting a program of public hearings and inspections. This hearing is the ninth to the inquiry.

[10.15 am]

MAROYA, Dr Alexander, Assistant Director (Policy), Universities Australia

SHARMA, Professor Arun, Chair, Deputy Vice-Chancellor (Research) Committee, Universities Australia

CHAIR—Welcome. Although the committee does not require you to give evidence under oath, I should advise you that these hearings are formal proceedings of the parliament and consequently they warrant the same respect as proceedings of the House itself. It is customary to remind witnesses that giving false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. We thank you for your submission. I now invite you to make a brief opening statement before we proceed to questions.

Prof. Sharma—Thank you, Chair. This being the ninth hearing, I think you have heard many of the arguments already. What I will try to do is give you a brief opening statement about some of the key issues, then I understand there will be a more interactive session when you can dig into some of the questions and the issues.

The research training and capacity of Australia to attract talented researchers is a fundamental issue going forward. There are a couple of aspects to this. One is the knowledge intensity of our industries going forward and high-value job creation. The other is the scholarly sustainability of our universities and research organisations in terms of training enough PhD students to take the places of retiring academics and researchers. This is a challenge that is being faced by the entire Western world, and that is where some of our challenges are going to come from.

The data is not very reliable, but, if we look at some of the OECD data on the number of PhDs per thousand of a population, Australia is not very high in the OECD rankings. We have not presented that data because it is very unreliable, but clearly countries like Switzerland and Germany are at the top of the heap. What reliable data we have is that Australia produces just 2.3 new PhDs per hundred university graduates. The figure for Canada is 3.9. It is 10.1 for Switzerland and 11.2 for Germany. What that means is that in the normal industrial jobs, in senior positions in industry and in the private sector you have more PhDs in management roles in some of these European countries which are at the high end of the knowledge creation than we have in Australia. Part of the issue is cultural, and I will touch on that in talking about some of the issues and what we can do about it. So there is the challenge of raising the quality of people because unless the nature of people in our industry increases I do not think Australia will be competitive in the high-end knowledge creation economy of the future.

The other issue is the scholarly sustainability of our universities and research organisations. There is a big cohort that is about to retire over the next 10 to 15 years, and the number of PhDs going into those organisations, not just in Australia but around the Western world, has not kept pace with the retirements that are coming. We have always felt that we will solve this problem by attracting people from China and India. I myself went from India to the US to do a PhD and then came to Australia almost 17 years ago and never left. But, if we look at the salaries in China, at the top places they are approaching Australian levels and in the next five to 10 years

Chinese salaries will match Australian salaries—and, if Hong Kong and Singapore are any indication, they will offer higher salaries for the top places, so they could actually attract our own researchers with their shiny new research facilities. India is behind, but in 10 to 15 years time India could also match salaries that we will have in the Western world. So what we are talking about is not just the retirement of our workforce; we are talking about two massive higher education and research systems coming into the equation over the next 10 to 15 years.

The challenge is very significant in terms of the research training requirements and what we do about them. So that is the global context. We have to not only increase the research training in universities but also attract more PhD qualified people from around the world to add to the workforce in Australia. These are some of the things that we feel are important for the entire national innovation system.

There are issues about how we attract more students to do a PhD in some of the key areas like science, technology, engineering and mathematics where there is a general shortage, how we can bring international students to Australia, how we make it attractive in this global war for talent, and how we enable universities to do something more for research training. Universities have done great things for research training, but they have done it at the expense of some of the other things because we have not been fully funded to do the research training.

We have taken money by not appointing enough academic staff, so the student staff ratios from 1990 have gone from 12.1 students per academic staff member to 20 now and you might say that is an efficiency dividend. But what has happened is that we have not created enough opening positions where PhD students can be employed as junior academics and they are leaving Australia. So they are some of the challenges. Those are my introductory remarks.

CHAIR—I wanted to pick up the issue of culture. You seem to indicate that there is a problem of culture and attitudes here that is acting as a significant obstruction to our advancement. Can you elaborate a bit more on that?

Prof. Sharma—If you go to Germany or Switzerland for example, the number of senior executives in companies that have a PhD is significantly higher. There are two things that happen. One is that in German and Swiss companies, or in many European companies, they do look at PhDs as an alternative to an MBA in providing corporate leadership. So that is a cultural bent of the society. But also these countries produce large numbers of PhDs that do not all become researchers. As we said, we produce 2.3 new PhDs per 100 graduating students. They produce 10.1 and 11.2 PhD students per 100 graduating students.

CHAIR—They are not all going into industry though because a lot are going into schools to teach as well.

Prof. Sharma—They go into schools and in fact what they have done is that industry and schools have raised the profile of the entire workforce. Many are going into government and the administrative services. So they are raising the profile. Why that is important is that PhD training trains you to ask questions at the boundaries of the discipline—how to do things differently. Most people who do a PhD get trained to ask questions and over the lives of their careers, they always move to new disciplines, new areas and new questions. They tend to be flexible. How we can encourage that is an issue. What we have to do is also produce PhDs who have more generic

capability—who are not just trained to become academics or researchers. But we do provide generic capabilities in terms of project management, commercial training and issues like interpersonal skills.

Both the Go8 and the Australian Technology Network have, in their input and submissions, talked about broadening the training of PhDs so they are not only attractive to the CSIRO, the universities or the medical research institutes but they are attractive to industry and the broader community.

CHAIR—We hear the term modern PhD and I think I am beginning to understand that what that means—that it is not the strict narrow definition that we have—either the lab coat or the university. Other areas of industry—and even learning itself—outside of university, and in this case schools, should be beneficiaries of PhD trained teachers and employees. That is interesting.

That is obviously going to require a cultural and attitudinal change from people in this country about learning and education. Do you believe that in this country we have a very low opinion of people who are highly trained PhDs or that our vision of education is skewed very much by the so-called demands of the market and that is interfering with the notion of education and what it is meant to do at various stages of a child's progress?

Prof. Sharma—We are where we are, and some of those attitudes are because we are also a blessed country in many ways. Maybe Switzerland does not have the resources base, so they have had to do some other things. I think the attitudinal change is going to require work on multiple fronts. One is that universities will have to broaden the capabilities, as we talked about, of the modern PhD. Industry will have to start looking at PhDs as viable for management executive positions. One way of doing it is perhaps looking at PhD graduates who could be employed, and if there was a government program—and some submissions have talked about it—which provided half the salary for one year for someone to work in industry and solve a specific problem the industry has, then industry might in some cases say, 'This person is actually quite valuable; we should employ them full time to do this.' You start making some inroads by exposing industry to a new way of thinking. They could have hired a graduate or an MBA to do that work. MBAs are great but they optimise, within the current paradigm, the management of the company, whereas PhDs ask: 'Can I actually break the boundaries? Can I actually ask questions that tinker with the business model in a new way? Can I actually change this product into something else so I have a bigger market segment?' PhDs always ask questions at the boundaries of what we are doing. It is not about the PhD; it is actually about that mode of thinking that we want to bring into our society as a whole. That is what we are talking about here.

CHAIR—I want to give my colleagues the opportunity to ask you questions, but I just wanted to ask you one more about the National Internship Scheme that you have developed which will see PhD students, I am assuming, collaborate with industry and other stakeholders. Because funding is an issue and, if you want to shift cultural attitudes, you need to have a lot of money behind you, have you thought about the possibility of industry being levied in terms of its contribution to higher degree training and universities? Rather than this sort of ad hoc system, have you thought about something more stable, comprehensive and integrated, because everyone is going to have to work together if we want to achieve this modern PhD?

Prof. Sharma—I think that has to be part of the equation. It depends on which stage we do it. Unless the industry sees the value, there will be some opposition to providing the levy. If there was a bootstrapping program for a few years where we did the internship and demonstrated the value—and the onus is on the universities to produce graduates who are actually able to add value—I think the case could be made and industry would willingly look at providing a levy like that. But I do not think that can happen right away because they have not seen the value yet.

FRAN BAILEY—I would like to follow on from this. I was fascinated to read in your submission about the national internship program. Just picking up on your comments, do you see this as industry being obliged to partner with universities in the form of a levy or do you see this as a voluntary participation system? I would also like to tease out some of the differences. You mentioned the UK model—the Knowledge Transfer Program. I would like you to explain the key differences between what you are suggesting, the national internship program, and the KTP that you mentioned in your submission.

Prof. Sharma—They are both trying to head in the right direction. I happen to be on the advisory board of the Enterprise Connect Centre too. The Enterprise Connect Centre actually has some resources for researchers in residence. I think it is a question of looking at the entire innovation system as a whole. We have proposed the internship scheme. There are some success stories coming out of the UK around the KTP. The Enterprise Connect Centres are going to have the researcher in residence scheme. I think it is important that we try to tie the whole thing together. I am trying to understand the question about the—

FRAN BAILEY—One of the things that struck me when reading about the KTP in your submission, was that they were able to identify the number of research projects and papers. But, following on from your opening comments, what you are really suggesting is the application of the research in industry and commercialisation of research.

Prof. Sharma—Yes.

FRAN BAILEY—I wonder if you see that as a major point of difference between the two programs, and what benchmarks you would put in place to test that?

Dr Maroya—I will add something on that. The KTP is possibly a little bit closer to what Enterprise Connect is trying to achieve in Australia, which is placing early-career researchers into business with some degree of subsidy to do that. The internship, which is really at a proof of concept stage, is to give people who are doing a PhD and who maybe do not want the traditional academic career the opportunity to try out a different kind of working. As we were saying, in Australia people in the professions—particularly those who do a PhD—do it very much with a view to an academic career, which is not the culture in other countries. By giving people the opportunity to work for a private research institute, or a mining company or something like that, we are saying there is this whole range of opportunities you have at the end of your PhD that we are providing the skills for. We think that would make PhDs, and also undergraduate degrees, a lot more attractive to a lot of people if we could do that.

FRAN BAILEY—Can I tease that out with one more question—I am just picking up on the PhD culture. What you are suggesting, and we have also heard it in other evidence, is that it is

deficient within Australian industry. For many Australian companies the MBA is almost the norm, isn't it?

Dr Maroya—Yes.

FRAN BAILEY—It seems to be that if you want to advance within any corporation these days you have to have an MBA. Is Australia different from other countries? Do we place greater emphasis on an MBA than a PhD? What does this mean?

Dr Maroya—If you look at the graduate employment data you will see that coursework master's students actually have better employment outcomes than PhD students. I have not seen the comparison, but I very much doubt that would be the case in a lot of other OECD countries. It is very much the case that as a professional development course—not necessarily an MBA, it could be a Master of Public Policy, or something else—the coursework master's degree is very much the professional development stream, whereas the PhD stream is if you want to go in an academic direction.

FRAN BAILEY—Right.

Prof. Sharma—I think PhDs would become more attractive to industry if they had some of the business skills that the MBAs have. But, in addition to that, what they are bringing is knowledge of a particular industry, a new way of thinking about business models, and a new way of changing the product mix. If PhDs got the generic capabilities—it may be around finance, it may be around project management, or it may be around interpersonal organisational skills—that additional bit would help. Obviously, that has to go hand-in-hand with the length of the PhD, which you must have heard from everyone is three years.

FRAN BAILEY—This is fascinating and we could probably spend hours talking about it. Are you proposing the National Internship Scheme is a voluntary scheme?

Prof. Sharma—Yes.

Ms RISHWORTH—Have you got any thoughts on ways you might change the honours year to make it a more attractive pathway? Whether or not you put the generic skills into the PhD, would you see any changes with the honours year to make that pathway more attractive, and more suited to being a real pathway?

Prof. Sharma—I will answer your question within a slightly broader question. It is about attracting our own domestic students to do a PhD, especially in some of the areas like science, technology, engineering and mathematics, where there is a real shortage, and then showing them a pathway into industry. The big problem is the economic issue: students are looking at how much their wage will suffer if they are going to spend 3½ to four years doing a PhD.

At the honours level, the seeds of a broader honours program have to be there. Some of the professional disciplines like engineering actually take honours more broadly than science and mathematics do. So there is a bit of that going on in professional disciplines, but you are absolutely right that the generic qualifications that we want in the PhD have to be built into the honours program.

But taking that issue further, how do we attract students to go into science, technology, engineering and mathematics? Many of these people are going to become teachers in universities—lecturers, associate professors. The government have made a political decision to provide HECS waivers to science and maths graduates who want to become teachers in schools. I do not see why, if they want to become university lecturers and raise the profile of teacher training eventually and address the skills shortage, that cannot be looked at. I am sure some of the groups have talked to you about that, that if someone in science, engineering or mathematics completes a PhD they get a reduction in or a waiver of HECS repayments. If we provide them with generic capabilities and after four years they go into a company at a salary level similar to one they would get if they had worked in the company for four years with the generic capabilities at an executive position, the business case for a student to invest in a PhD program becomes very sensible.

CHAIR—And clearer.

Prof. Sharma—Yes, and clearer.

Ms RISHWORTH—But we are talking about someone moving into private industry. How do we make industry take into consideration those four years? The government is not setting that salary.

Prof. Sharma—I think you talk to industry, first of all by exposing it via a subsidy like the KTP scheme. You identify a problem in industry and you say, ‘Here is a PhD graduate. We will provide you with a subsidy to employ this person for a year to solve this problem.’ They are exposed to what a PhD can do for them, and in some cases it will provide them with a business case where they want to employ this person in the future. If we start providing some of the basic MBA skills around finance and project management as part of the PhD program, then these graduates will actually appear more attractive than those with an MBA to some of the companies that are trying to go up the knowledge value chain. It will not happen with everyone who is trying to cut costs and to optimise their business process. But, if a company is faced with international competition and the only way they can compete on the global market is by raising the value chain, a PhD with good generic business skills will be more attractive to them than just a pure MBA. That is how, over time, we will be able to get there.

Ms RISHWORTH—That is a good point.

CHAIR—Yes.

Mr RAMSEY—Thank you very much, Professor. You have focused on something that I identify as being one of the problems—that is, that industry does not value our PhDs either. Some of the other institutions have been looking at how they get a bigger share of a diminishing market rather than actually growing the market.

Prof. Sharma—It is about the national innovation system.

Mr RAMSEY—Yes. But I want to focus on another part of your submission, where you reflect on quality school education. This has come up a number of times, too, and we have got around to talking about things like prerequisite subjects for entry to university and possibly

playing around with the way that we rate TER scores for different subjects—particularly in maths and science and perhaps in the English area, where we are not getting enough people coming through the schools with appropriate skills to attack university studies in the first place. If we have more undergraduates then hopefully we will have more people wanting to go on to higher research. Could you give us a view on what you think we need to do with the school system to increase the number and quality of candidates for university training in the first place.

Prof. Sharma—I think that that is fairly important. Again, one of the things that you could look at is the same thing that works for attracting undergraduate and honours students into the PhD program; it probably has some solution in terms of the schools. A lot of submissions have talked about getting researchers and scientists to go into schools and encourage people, and I think that should be continued.

But what we have found is that, when you get lots of undergraduate honours students hanging out with PhD students, they start becoming inspired by a way of learning and a way of thinking. So what many universities do is put honours students' desks around those of the PhD students. They go out to the pub and talk about a person who has written a paper and is going to present it at a conference, and they get excited and inspired by that.

We have a lot of problem attracting students who are eventually looking at careers in science, technology, engineering and mathematics, so concentration is something that actually makes a lot of sense. A lot of high schools have students who want to go into many different areas. If schools that are focused on science, technology and engineering are collocated with good universities where first-year university students and the bright high school students are able to mingle then that pathway becomes easier.

The Queensland government—and I am sure there are examples like this in many other states—has looked at high-quality academies. In certain areas they have placed schools around universities and have tried to attract top-quality students from that state into one place. The jury is still out as to whether that will work or not. I used to be the head of the School of Computer Science and Engineering at the University of New South Wales. We used to go to James Ruse High School in New South Wales, and some of our most talented students used to come from there because they were part of a bigger cohort that mostly talked about maths, science and engineering.

People are very tribal in nature. We have to create a critical mass where people are on about science, maths and engineering and get them to mingle at a social level with the next level where we want them to go. That is when they build those aspirations. It is like any other discipline. People become lawyers because they have lawyers in their family. So that is the kind of thing that we have to do at a cultural level.

CHAIR—But shouldn't students generally be interested in particular areas because they have the opportunity to be inspired in whatever school they attend in this country to pursue them? I understand what you are talking about when you say we should segregate or centralise certain talents, but the idea is to inspire them in the short term.

Prof. Sharma—What I am talking about is that we have a market failure right now and we need to address that. Once society understands the value of science, engineering and

mathematics and once people realise this is happening, you would think that this will happen in exactly the way you have suggested. So I am talking about a bit of market failure here.

Mr BIDGOOD—Thank you, Professor, that was a very interesting presentation. Amanda Rishworth and I are on the House of Representatives Standing Committee on Health and Ageing. We have just come from there and we have just been presented with a report that has been released today called *National Seniors Australia: independent voice for the over-50s*. One of its key calls is for aged people to be able to continue in the workforce. Something I am picking up is that part of the premise you have put forward is that there are many people retiring and there is a demographic shift with the baby boomers. What is the average age of retirement for professors and PhD holders? What is the demographic?

Prof. Sharma—There is no retirement age for professors. What we are finding is that professors who are very productive are doing research in their 70s and they are holding ARC grants and NHMRC grants. We in university administration love them. Sometimes they retire and go on a partial salary and still produce as much as they were doing. These are passionate people. But then there are people who stop performing, and it does make sense that they move on. I am sure Mandy Thomas will talk to you about the experience at the ANU, where there are a number of people who have retired but continue to hold offices at the university and they keep going back and doing research. This is what they do with their lives.

But I want to pick up on your point, because this is where I think something needs to be done. We have a shortage of maths teachers around the country but there are so many accountants and financial planners who make a killing and retire in their early 50s. Why can't they be maths teachers? Because, first of all, they have to go through accreditation which is cumbersome. Why can't we take some of our engineers who have made a good fortune and have even retired in their 60s and want to contribute to teaching? Why can't we look at making the system simpler for them to start becoming good teachers in their local communities?

CHAIR—Why could we not just raise the salary of teachers?

Mr BIDGOOD—What I would like to ask, to engage in debate with you, Professor, is this. What barriers do you see? What are the key barriers? Are they financial or lifestyle? Are they to do with research facilities? I am particularly thinking of people who are approaching 65 and getting ready to retire. That is what my focus is on at this moment in time. What do you see as the main barriers that stop them from staying on?

Prof. Sharma—That stop them from staying on?

Mr BIDGOOD—Staying on and working. Are you suggesting it is the financial or is it that you just do not have the facilities to house them or is it that people just decide they are tired, they have had enough and they want to go?

Prof. Sharma—The question can be answered at several levels. When there is a stock market dip, people delay their retirement. They have become used to a certain level of superannuation and after the stock market dips, people delay their retirement, even in academia, by two, three or four years until the thing picks up. So that always has to be taken into account. Many of the highly productive academics would like to stay on. The problem, we as university administrators

find, is that, because we have not invested in the capital infrastructure of the universities along the way, we are not able to provide them with the offices or the lab facilities where they can continue to be productive. For example, if they keep getting their ARC grant then we can justify giving them an office. After two years, they only get an open-plan desk. Slowly and slowly the pressure starts coming. These bright young people are coming in and the better offices and the better lab facilities have to go to them.

Mr BIDGOOD—So there is an issue of equity?

Prof. Sharma—I am talking about people who have retired but they are still continuing to do research in a general capacity. If someone has not retired there is no issue of equity. If they are performing, they get the same facilities.

Mr BIDGOOD—So there could be a facility constraint. I am keen that we do not lose all this wisdom and this knowledge and that we are doing everything that we possibly can to encourage people to stay in the workforce longer, particularly those at a PhD level or those who are professors, and make sure that we are doing everything we possibly can to encourage that whether it is by financial incentives, lifestyle, working conditions or whatever other things we need to apply.

Prof. Sharma—Many researchers and academics at 65 will continue to have a scholarly life. They want to do research but they do not want to be engaged in a lot of the administrative work and everything else. So they retire, they enter into a new contract with universities where they get paid for a part of that time and they do research. And, again, if we have the resources to provide them with the right level of facilities and everything else, I think we will keep these people productive for a much longer period of time.

Mr SYMON—Professor, I would like to pick up your point in the submission on the student-teacher ratio. We probably have not touched on it too much so far in this inquiry. There are a couple of points that come up. Yours is quite detailed, especially as to the linkage of the drop from a ratio of 12:1 in 1990 to 20:1 in 2006. Of course, the effect is on employment prospects for researchers in universities because there simply are not as many positions available. Could you expand on that with maybe reasons other than just lack of government finance? Certainly, I understand, there have been cuts in funding to universities that have caused them to not be able to employ as many people, but is there a cultural change there as well or is it solely financial matters that are causing that?

Prof. Sharma—The financial one is the main issue. Every university wants to do research, because research is associated with our brand. So, for our market position, it is important that we continue to keep investing in research and keep investing in the research training aspects because if we do not do that our brand suffers and we are not able to attract students. We have subsidised research and research training from every aspect of university revenue because the funding has not been previously there. We look at international students; we take that money and provide more PhD scholarships. From the teaching budget, we provide more support for research because research is a game that no university can afford to be out of as that is where our brand is built. What has happened is that in some way the student to staff ratio has deteriorated because we have not been fully funded to do research. So we are taking resources from other places to continue the research part of our enterprise.

Mr SYMON—But it is still declining?

Prof. Sharma—It is still declining, yes. So that is the challenge. I think if research and research training were fully funded and if universities' infrastructure and other things were addressed at the level which we would expect in an OECD country of even average level, then you would see a lot of changes flowing because of that.

Mr SYMON—Do you have any examples of other countries and their student to teacher ratios in this field?

Prof. Sharma—I do not have exact data at my fingertips, but—

Dr Maroya—We would be happy to supply that to the committee.

CHAIR—Very good.

Prof. Sharma—That is actually at the heart of the problem. Treasury will tell you that. We are still doing the research, we are still producing PhD students and our researchers are very prolific in terms of their publications, but we are doing it because we are cutting other parts of our business to support it.

CHAIR—To very quickly go to the issue of our expenditure for research and development as a percentage of our GDP, I understand in your statistics it is 1.76 per cent, compared to the OECD average of 2.26 per cent. How much money will it take for Australia to get up to that OECD average? I am sorry if you do not have it off the top of your head; I was hoping you might give us some indication.

Prof. Sharma—No, we have done the sum. It is several billion dollars.

CHAIR—Several billion. Is it five, six, seven?

Prof. Sharma—I think it is less than that.

Dr Maroya—It is a few billion dollars.

Prof. Sharma—Two or three billion dollars.

CHAIR—Two or three billion dollars to get us up to speed.

Prof. Sharma—We will provide you with the exact figure. We have done that calculation.

CHAIR—We would like that. Thank you very much.

FRAN BAILEY—You referred in your opening statement to the unreliability of data for the OECD. I noticed in this morning's press that there was an article about Australian universities not being equipped to provide the relevant data for the OECD. While we have heard much evidence presented to this committee about how we lag—and I think we all accept that—it raises

an issue: if Australian universities are not equipped to provide reliable data to the OECD, it means that we are working from a fairly shaky basis when we start to make points of comparison. Can you explain this?

Prof. Sharma—I did not say the OECD data is generally unreliable. All I said was that, with regard to the number of people with PhDs per thousand in population, that data has different definitions and that is why we are not using that data in our submission. But a lot of the other data in the OECD is quite reliable, especially in terms of the investment in research that countries make. On the issue about the Australian universities not being equipped, I think we do provide data. I think Universities Australia may have some comment on this issue.

Dr Maroya—I think the standard of data that we have in Australia is pretty good on the number of graduates we are producing.

FRAN BAILEY—Perhaps you need to look at this article. You might need to refute it, because it was a fairly damning article.

Prof. Sharma—Most of the OECD data is quite reliable.

CHAIR—Thank you very much. It was a very valuable discussion.

[10.56 am]

CHUBB, Professor Ian William, Vice Chancellor, Australian National University

THOMAS, Professor Mandy, Pro Vice-Chancellor (Research), Australian National University

CHAIR—Welcome. Although the committee does not require you to give evidence under oath, I should advise you that these hearings are formal proceedings of the parliament and consequently they warrant the same respect as proceedings of the House itself. It is customary to remind witnesses that giving false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. We thank you for submission. I now invite you to make a brief opening statement before we proceed to questions.

Prof. Chubb—I think this is a very important inquiry. It is an issue that, for many years now, has needed to be inquired into and, indeed, to have some of the problems remedied. There are some core and fundamental issues that need to be addressed, and doubtless you will explore some of those with us. I would include things like the numbers undertaking PhDs, the attractiveness of PhDs to our best and brightest, the way in which we can support the best and brightest when they choose to do PhDs, and the career path options for them after they complete their PhD, which, by definition, I would not rate as attractive as they were for my generation.

I think something has to be done about that because it is not just that we are losing them to other countries; it is that they are not doing the PhD in the first place. Our numbers are relatively small, the proportion in the workforce with a PhD is very small. The career paths are dubiously attractive, and the scholarship rate is miserably low. So there is a whole combination of things that have, in a sense, conspired against the whole bit about PhDs being an attractive option for students, in particular the best and brightest. A lot of them have got multiple options; part way through their third year they are getting job offers and broader experience through double degrees, and they choose the other option provided in that path. It is quite a complicated area and a can of worms. The really hard decisions would mean resource changes, probably in absolute amounts and also in the relative distribution at the moment.

CHAIR—Professor Chubb, I do not know whether you were in the room when I asked the question about how much money it will take for Australia to lift itself up to the current OECD average. I think currently it is a few billion dollars, so we obviously all agree that money is an issue. I am interested in the issue of domestic students, and I want you to tell us a little bit more about the opportunities that you have suggested in creating incentives for domestic students to undertake research degrees. I guess the question is: how do you develop a domestic student base? Lots of other submissions have talked about a short-term resolution of this problem by increasing the number of international students who come here. Certainly the previous witness raised an interesting point that I had not picked up—that that might not even be an option anyway now because a lot of our surrounding neighbouring countries are increasing the value of their PhDs and their facilities and therefore we may even be missing out on an ability to compete at that level. In relation to domestic students, which is a real issue, other than the stipend and the length and the difficulty, how do you attract young Australians?

Prof. Chubb—Mandy can give you a much better and more detailed answer than I can, but let me just say that I think part of the answer to that is the purpose to which a PhD graduate puts their research training. A substantial number of our PhD graduates from the ANU, given the particular role and character of the ANU, go into other academic positions. We are a great populator of the academic communities of not only our own institution but also Melbourne, Sydney and others too. Our graduates come out with a particular orientation. On the question of what you do with them, career paths that were once well laid out and clearly delineated are now blocked because previous generations are still sitting in them. That is not a bad thing, but it is an issue that has to be resolved.

We have a research support system which is, I think, punitive. I have two daughters. I was warning Mandy that I would use my own personal example, but it is illustrative! They did science and law double degrees. They did very well in both degrees but were stellar in science. They did honours with supervisors who they had a great deal of respect for and saw them writing grant applications for months each year in order to get enough money to do the research that they spent 20 years being trained to do. They knew that if they did a PhD—which they would have walked into in terms of admission—their first two or three jobs would be dependent on somebody else getting a research grant that covered a salary. How do you buy a fridge, a car or a house? They say, ‘What else have we got?’ A law firm offers them \$50,000 to start against a \$20,000 PhD scholarship. What choice is there for someone who will already leave with a substantial debt? It is not even as if the whole undergraduate experience leaves them debt free and educated. It leaves them educated and riddled with debt. The combination of things has actually made it less attractive, which is a numerical issue.

I think that the PhD students we do get are very good. I can speak for a few universities given my perambulations around the sector. I think that the students who are committed to doing a PhD are generally very good. At ANU, they are very good, committed people. But if we are thinking about expanding the numbers then we have to change things other than by simply saying to ANU, Sydney, Melbourne, Queensland or wherever else, ‘Take more.’

It is a complex set of issues and it does get down to being turned on to inquiry early enough in the education process such as in primary school and secondary school so that inquiry is the word that they would use when later they might use research. It means getting students interested in science early enough to pursue science at university with the intention of exploring their capacities as researchers and so on. Then it requires the post PhD world to recognise the additional qualifications and support them. It requires universities to change away from what Mandy and I suffered from—the old apprenticeship model. We have to prepare PhD students for multiple options post their PhD and not simply for a research career, which is the sort of PhD that I did. If you can solve all those problems, you will do a great service for this nation. But, if it were easy, it would have been done.

Prof. Thomas—I want to reinforce the issue of the need for many other sectors apart from the higher education sector to recognise the value of a PhD. If, when jobs were advertised, there were a statement that a PhD would be a preferred candidate in business, in government and in a whole range of sectors, we know from the evidence overseas that these PhD graduates would stimulate the economy in all sorts of ways because of their training to be creative, innovative individuals who will add value to a whole lot of different sectors. We know, for example, that in Germany half of the senior management in the top 200 companies have PhDs. We are seeing the

evidence of the value of PhDs to the innovation economy. If we could have in Australia that recognition that that would be an advantage that people could see in job advertisements and in the requirements for certain positions, they would start to see that it was not simply about training the next generation of academics.

CHAIR—We have also learnt that in Germany a significant number of secondary school teachers are PhD trained. Do you see a possibility of that level of qualification becoming an issue with secondary school teachers?

Prof. Thomas—In many European countries not just PhD but master's training in research is a requirement. I know that in Denmark, too, it is a requirement for all secondary teachers to be an expert in a field that they are teaching in, and this does seem to have benefits for the quality of education of secondary graduates. But that would be a long-term goal in Australia; it would be something that would be very difficult to change. Overall, we have a low number of PhDs in the workforce, and I would think that it is a matter of where you put the priorities and where you want the PhDs to go. We have the academic workforce issue first, and then I would imagine industry would be another priority. Clearly, stimulating primary school and secondary school students to go on not only in science, technology, engineering and mathematics but also in languages other than English—those sorts of areas where we are starting to see shortages in our tertiary sector—would be very valuable, but it is something that would take considerable investment.

Prof. Chubb—But the other part of an answer to the question is that we have got to look at the in-service support for the teaching workforce. Having a PhD and graduating when you are 26 does not help you when you are a 46-year-old teacher of year 11 any more than any other qualification did that you took out 20 years before. We have a teaching workforce which, by definition, has a fair number of members who graduated quite a while ago.

I do not know enough about this and I guess I am sticking my neck out, but I would say that it is probably a fair assumption that the in-service support and development opportunities for teachers are not what they ought to be. Even if we did go down the track of having people with research PhDs coming out—not further learning, which is a lot of what the German doctorate is—you need to have a system whereby you support the teaching workforce so that if they are teaching biological science they are teaching contemporary biological science as we know it today. That is what their young students are seeing on TV but not necessarily getting in the classroom because the teachers were trained 20 years before. So support for the teachers, ultimately leading to more of them with those high-level qualifications and research base, is probably the way to go. You can start immediately and you can build up to a point where the new ones coming through go through an additional training program.

Our experience is that it is pretty hard to do that. We offer a degree which is cheekily called Master of Contemporary Science, designed exclusively for the in-service support and development of teachers. But in order for us to be able to offer that as a graduate course we have to charge a fee. If the education department will not pay the fee, the person has to. If the person has to, do they get any promotional advantages? I do not know what it is like now, but the answer used to be no.

So there are all sorts of circumstances that militate against acquiring the additional qualifications; it is hard work. If you have a full-time teaching job, meeting the requirements of the ANU to study chemistry, an assessable subject, and get a grade at the end is hard work, so you need a lot of commitment. I think we should be encouraging our education departments—public, private or whatever—to support the educational development of their teachers more overtly and comprehensively than we have been doing. We should go beyond the rhetoric.

FRAN BAILEY—We have had much evidence put before us about the inability to attract domestic students and even the difficulty in attracting international students—and I have picked up your level of concern. Are you also concerned about the quality of the research that is being undertaken?

Prof. Chubb—In the broad generic sense, yes I am. I think there is inappropriate distribution of PhD resources within the country. I do not believe quality enters the equation. I think that if we are going to be serious about having people with what I would call ‘real PhDs’ then we have to pay attention to the standards, the standings and the quality of support. I once got myself into trouble when I gave a speech in which I said there is close to an inverse relationship between the number of dollars that come to an institution per PhD student and the amount of money they win from research grants in those institutions. The ANU gets around 30c of PhD student money per dollar of grant money whereas some other institutions get \$4.50. I think that is ludicrous. I got into trouble because the immediate conclusion that was leapt to—which I was clumsy enough not to close off—was that I was saying the money should be taken away from them. I was not actually going to argue that we should take the money away from them. I was going to argue for additional resources that addressed a maldistribution—and I think it is a maldistribution.

If you win money competitively for research grants in a particular quantity, it gives you some sense of the quantity and quality of work that is being done in your institution. If you get the sort of ratio that I have just described then that is silly. That is not to say that the area in the institution that gets a lot more than we do should not have PhD students—notwithstanding the fact that they are growing an area or developing an area or a new university that is trying to focus in a particular research area and needs some support for a while to be able to get the necessary runs on the board. It is not that we should not support them; it is that we should not under-support us as a consequence of that support. I think that is a real silliness in the situation at the moment.

FRAN BAILEY—Professor Thomas, you commented about the lack of recognition and acknowledgement of PhDs in industry. It was put to us by the previous witness that we should consider a national internship program with industry. Is this a model you would support to raise the level of awareness of the value of a PhD in industry?

Prof. Thomas—I would support that. However, we have recently looked at the destinations of ANU PhD graduates. We have found that 80 per cent or more of our PhD graduates become academics or enter research careers outside universities—in government research bodies. For us it would be too narrow just to have internships in traditional industries. The internships should be offered across the board to organisations—not just to industry but to government bodies, schools and other sectors.

That would be very important because, at the moment, some of the schemes around encouraging students to engage with industry mean that students are not offered a whole range of other professional development opportunities. For example, the commercialisation training scheme, while it is to be applauded, is too narrow in its focus. It could offer much more if we were to suggest that students could also be trained to teach. Teaching is not just valuable in an academic setting; it is also valuable in many workplaces, where people have to learn how to disseminate their knowledge and the skills they have gained within the PhD. We would support having it broader than simply internships in narrowly defined industry.

FRAN BAILEY—The challenge is building for the future and ensuring future research in academic institutions, not just adding the commercialisation aspect—although it is important for research for industry.

Prof. Chubb—Yes, it is. We said in our paper somewhere that, at the moment, roughly 48 per cent of the Australian academic workforce has a PhD. I was surprised when I saw that figure. It is qualifiable; we have large schools in some disciplines where PhD is not the norm. Some of these are professional schools. The law school, for example, has a big research output but maybe only 50 or 60 per cent have a PhD because it is not the norm in that profession but it does not stop them doing research. Probably many more have a master's degree. It is a complicated thing.

Notwithstanding that, if we are going to run the line that we are key elements in the future research positioning of Australia and the acquisition of the knowledge that comes with that, then you have to do better than having 48 per cent of your academic workforce—which is your training workforce, in a sense—with a PhD. I think, as we said in our submission, part of our role is to actually skill our own workforce as well. We will do that in a number of ways. Some of the PhDs that have been recently graduated from some of the newer universities have their own staff that are put into PhD programs. That is okay. That is part of what needs to be done.

But we face other countries that would regard it as really silly that we potter along in this particular way, complacently resting on the oars while the Chinese get 59 gold medals because they actually invest selectively and massively. I can give you two numbers that frightened me. The Chinese Academy of Science has a graduate school separate from the universities. They have 30,000 PhD students in that Chinese academy—and I know we can divide by a large population, but it does not matter. This is a concentrated effort of the very best and the brightest in an education and research environment that is compelling. They have 30,000 PhD students offshore as we speak, going back at the rate of 7,500 a year. They have big universities. Their top nine universities have massive graduate programs. This is a huge investment in human capital development.

If you talk to them, they do not use the words but they have the same intention that the founders of the ANU had when they established it in 1946. It was 'to do research and education at very high levels with regard to the world so Australia could buy a place at the table with the civilised nations of the world'. That is still as important today as it was in 1946 and, if we let everybody else do it and think they are going to give us all that we need, we are wrong. If we make no contribution to it, we have no right to expect it. There are all sorts of philosophical, as well as practical, reasons for my saying we cannot get too far behind. We have to be contributors. We have to be a destination for some of the best. We have 800 Chinese students at the ANU as we speak. There are many more thousands in Australia as we speak.

The Chinese investment in human capital, in infrastructure and in support for the research they do is extraordinary. And that is one country. The Koreans are trying to do the same; the Japanese have just corporatised their universities to get them out from under the yoke of the ministry. The Malaysians have declared that they want to be the education centre for the region. The Singaporeans have got foreign universities investing in capital in Singapore, and they teach in English. So we can send students to selected Korean universities today and they will be able to do a course in English. One of the advantages we had—a high-quality, research based, well-structured education system delivered in English—is not something have alone in this region anymore. That frightens me, I have to say. If you think about the consequences of Australia not being able to play in that game, we are in deep strife.

Mr SYMON—Professor Chubb, my question—and it is one that we have explored before—is about the length of scholarships. I note your submission says that, at 3.5 years, they are ridiculous. I presume that means they are too short.

Prof. Chubb—Mandy must have put that word in there!

Mr SYMON—It would sound, from what we have previously heard, that that is the case. I would certainly like your views on what length they should be and also on what time it currently is taking your students at ANU to go through.

Prof. Thomas—Currently, the average length of a PhD at ANU is 4.3 years. It is 4.7 years nationally. We have one of the shorter ones at ANU, and I think the reason is that we do provide good resources for our PhD students where we can. We also have more full-time students than part-time students, so that benefits a shorter PhD. But there are very few that finish in three years. Last year we had fewer than five students that finished under three years, out of more than 300 that graduated. The PhD scholarship could be 3½ to four years. Considering that the average is 4.3 years, it makes sense to make it between 3½ and four years, which seems to be the international benchmark when we are looking at equivalent universities around the world.

Mr SYMON—So you would suggest 3½ years with a six-month extension?

Prof. Thomas—That is right. Considering that some students finish at three years, they could be evaluated at three years as well. Students are presently evaluated annually as to their progress. They could be evaluated at three years, and they may have finished in that time. If they complete fast, they will complete fast whether the scholarship is four years or 3½ years. It does not appear to have an effect on students that are accomplishing a shorter PhD. The shorter PhDs are in particular fields. They are more likely to be in mathematics and engineering than in other areas such as the social sciences and humanities.

Mr SYMON—At the moment, if a student completes early and they put their submission in, the scholarship stops?

Prof. Thomas—Yes.

Mr SYMON—Do you think that should keep on going whilst they write up papers in between putting in their submission and actually being closed off, as it were?

Prof. Thomas—There could be an opportunity for some postdoctoral preparation—publication or some experience, either in teaching or as a research assistant, would be very beneficial both to the universities and to students and their training.

Mr SYMON—It seems to me at the moment that it is a bit of a netherworld. When you put your submission in, you go from having a stipend one day to being cut off the next. You then have to wait for things to come through the system.

Prof. Thomas—I agree. It would be very useful if we could use the scholarship money—if people have completed before their four years—for that bridging period, particularly to provide more training and experience for the careers people are going to undertake.

Mr SYMON—So more generic type training in areas that most employers would have an interest in their people being trained up in?

Prof. Thomas—That is right, or internships within industry or government. That would be very helpful.

Prof. Chubb—It would also be an incentive, I think, for them to complete within the period so that they have some period afterwards where they still have financial support. The problem for them at the moment is that there is only a disincentive to finish, because, as soon as it is submitted, the scholarship is cut off. The problem is that, totally outside our control, the assessment can take months.

Mr SYMON—That is right.

Prof. Chubb—In some areas, they can still get a postdoc, because the assumption is that it will be approved, and most of them are, so it is not a great risk for them. We employ people whose PhD is under examination. But it is different by discipline, so there are some where that does not happen. The problem is that we try to find generic solutions to complex problems.

Mandy is an anthropologist. The anthropologists need a year's fieldwork. You need to keep them on the register as a student for all sorts of other reasons, including insurance and the like, so they stay a candidate, but they are in Vietnam or somewhere like that. By definition, that will take them longer than three years. Either the university backfills and finds money or the scholarship is extended to get a better quality outcome by enough to enable them to spend some more time, if there are residual funds, and to give them some reason for getting it in early.

Mr SYMON—Thank you. That is enlightening.

Mr BIDGOOD—Thank you very much for both your presentations. I certainly enjoyed reading through the submission. I have two observations, and then I will ask a question. The first thing is that, having done a correspondence degree myself, I was going to embark on a master's, and for various family reasons I did not carry on with that. I remember that at the time, in about 1996—and the stipend at this moment, as you say here, is \$20,007—the stipend was about \$19,000, so there has been no move at all. What is appalling about this is that there is no respect, by whatever government, for the intellectual capital we have in this nation. I live in Mackay, in Queensland. You can go out to the mines as an 18-year-old and do an apprenticeship as a forklift

truck driver for \$80,000 a year, four times what we are offering potential intellectual experts of the nation, the leaders of the future in innovation, creativity and science. We are showing no respect here. So I am in full agreement with you that that has got to be changed, and that is reflected in the percentage of amounts of money we put into research and development as a percentage of GDP. I would certainly endorse bringing it up to at least the OECD average, if possible.

The second point which I pick up on is that Australia's intake of overseas students is 17 per cent, while in the UK it is 40 per cent. Let us play a mind game and just imagine that we were to suddenly say, 'Okay, we really want to help our region, particularly the South Sea Islands, and encourage students to come from there.' Could we realistically go to 40 per cent? Have we got the facility, the capacity? I doubt it. But do we really need, as a nation, to rely on the funding coming in through education in order to sponsor our own research and development? I have a concern there.

The question I want to ask you is about the best international example. Obviously the Germans are doing a great job, with 20 PhDs per thousand. How do they do it? What is their stipend? What is the average length of a PhD there? What is the best international example that we can take on board?

Prof. Chubb—I do not know the average length in Germany. It would not be very long.

Prof. Thomas—It is five years.

Prof. Chubb—They have a very different first degree structure. I think their first degrees were seven years or something. Now they have gone to the harmonisation of the EU, with a three-two-three structure, but they had quite a different educational structure. For 20 years, we have been using the Germans as one example or another in a variety of ways. The Australian government, as far back as the early days of Hawke, used to send delegations to Germany to see why they did a lot of these things: the links between vocational and secondary; the links between secondary and university; the links between vocational and university. But I suspect that, in part, it is a cultural issue and they have great respect for the people who make things and think about things and make them better. We have tended not to do that. We have tended to not need to do that; I guess that is probably the best way to put it.

Mr BIDGOOD—How do they fund their PhD students? What is the actual equivalent Australian dollar amount for a student? I assume it would be a lot more than \$20,000.

CHAIR—Are they salaried? I seem to remember that there are salaried.

Mr BIDGOOD—If you could get us that information on those—

Prof. Chubb—We could get it, yes.

Mr BIDGOOD—We need that information to make clear decisions as to how we are going to go, and we have to look at best examples. I just think that is appalling, the \$20,000 that we are offering.

Prof. Thomas—One of the things that happens in Germany is that the PhD students are paid to teach at the same time. They have teaching assistantships and so they are paid to teach and to research concurrently. That is also happening in some areas in the United States. The other thing that happens there is that they now have a system where they have defined certain universities—nine of them—as elite universities and they have just put extra funding in to support research training specifically in those research universities.

Prof. Chubb—This is Germany, which, for 55 years, ran a totally free education system with no limits on time. I have been a frequent visitor to Germany, and my colleagues used to lament the fact that they had 45-year-old first degree students who had been there for 20 years because there was no incentive to move on and out. It was a completely different approach. As Mandy said, they were in these other levels and they had specialised institutions. I think the important message is that they picked nine and they are funding them specially. They are funding them selectively and they have a federated system, so they have to worry about this federal-state issue. They were taken to court about it; there were court cases trying to stop it happening. All these sorts of things were done, but at the end of the day they decided they were becoming uncompetitive.

I will just add one other thing which has occurred to me. One of the other issues is that—and I use geology to illustrate the point—in Australia at the moment, with the big companies exploring, digging, exporting and everything, there is a demand for geologists. So you get a small number of undergraduate students studying geology. The best of them get taken out as soon as they are finished; mostly, they do finish. The academic workforce is ageing and particularly in geology because the ones coming through are going to work in an industry that is booming, so we are actually not closing a loop here. We are educating these people who are going to work over there. These people here are getting older and each one they educate goes over there and does not do what was traditionally the case—namely, a proportion of the graduating class would say: ‘Research is a great career; being an academic is a great career,’ and all of those sorts of things. So we have PhD-trained academic geologists right now, but the average age of them—not that we have ever done it, because we do not look at birth certificates on a daily basis, but I am sure that we would find that they are not being replaced. Yet who could say in Australia that geology research and the education of the next generations of geologists is not critical to our future prosperity? How do you get all those companies putting people back in to do PhDs? Whatever arrangement it is, it has to be different from what we do at the moment.

Mr BIDGOOD—Excuse me, Chair, I have to go to another meeting now.

CHAIR—Thank you.

Ms RISHWORTH—The previous presentation talked a lot about adding in what they labelled as ‘generic’ skills, or ‘industry’ skills in terms of business skills and project management. Over the inquiry we have heard varying agreement with that. Some people say, ‘You get a lot of skills that are not recognised already in a PhD. We don’t need generic skills.’ There are people who are enthusiastic about it. There have been a variety of different attitudes. What is your university’s attitude in terms of adding in that component and making it more attractive to industry?

Prof. Thomas—I believe very strongly in adding in generic skills to the PhD. While it is true that just undertaking the research itself gives students a lot of skills, a lot of the students cannot identify them as skills that they have. Part of the process that is needed is that we need to demonstrate to them what skills they are learning through that training. We also need, as I mentioned earlier, to teach students how to teach, project management, industry skills, public speaking, report writing—all of those sorts of things that are really valuable skills they could learn in the PhD, and they should.

The problem is that it takes extra time, and with the length of a PhD that is another reason it is important to be able to fund them for a bit longer. There is evidence now that graduates are saying they would have liked to have more of those skills within the PhD. There was a UQ study of a Group of Eight graduates at seven to 10 years out of a PhD, and very many of them said that they would have preferred to have a whole lot of other skills added in. This is now seven to 10 years beyond their graduation and we are providing that to a lot of our students. I think it is necessary, considering that more than 50 per cent of PhD students nationally do not become academics. They enter a lot of other careers.

Ms RISHWORTH—I asked this before: the honours year is treated like an undergraduate degree, effectively, but it is the gateway to a PhD—did you have any thoughts of how that might be changed, or are there any things that can be changed to make that transition a little bit smoother, or more attractive?

Prof. Thomas—The honours degree is very valuable because students learn research skills within the last year of their undergraduate degree. However, high-achieving students could learn research skills, and do. At the ANU many students undertake what is called a PhB, a Bachelor of Philosophy. They are very high-achieving students. They have to have a UAI of 99 to enter that stream. They are gaining research skills right from the first year of their undergraduate degree and working in research-intensive environments.

We are finding now that fewer than 20 per cent of the applicants for PhDs have honours degrees now. Most of them have master's, or other qualifications—international as well as domestic students. So there is a decline of interest in students undertaking honours degrees. Many of them prefer to go on to master's. I am not sure how we can address that, but clearly we need to diversify the streams into a PhD. We are recognising work skills as well as educational training for entering a PhD.

Prof. Chubb—One of the things that we have got to use all of that for is to try to ensure that what is a fairly conservative process does not inhibit risk evaluation and willingness to manage risk and does not encourage risk-avoidance. I would be very happy if every single ANU PhD graduate came out, and five years later they declared themselves to be really capable of evaluating a risk and managing it and not avoiding it. Our whole process is conservative: our funding arrangements are conservative; the funding of research is conservative. You cannot afford to put up a speculative proposal because, if you do not get an outcome that you can report with papers at the end of it, then you do not get another one, or it is more difficult to get another one. So you do something that you are more certain about, and so on.

All of that is a shift in the way that the institutions have behaved. What I see as the biggest single change in my time, which is now getting on for a while, has been the erosion in our

discretionary strategic capacity as universities. We used to be able to deploy our resources into projects that were a bit speculative or a bit blue sky. We do not have that any more. We have been indexed on average over the last 15 years at 1.5 per cent per annum, out of which we are supposed to cover pay rises. If I paid the staff 1.5 per cent per annum more each year, we would be in the low 80s for our professors and not at \$120,000, which, when you think about it, is extraordinarily poor anyway.

All of that has forced a different culture within the institutions. We have veered towards the more conservative approach to these things and not towards the more imaginative where we encourage people and say, 'Try it. You'll still get a PhD if you try it and it fails. The main thing is: can you establish a hypothesis, can you design experiments to test it, can you modify it, test it, modify it, test it and show that you know the process?' That has been to the national detriment.

The other thing that is a pressure upon us at the moment is the EU harmonisation, with the 3-2-3 and all of those quite odd and unusual—in our terms—European degree structures and relationships that come together under that. In a 3-2-3 there is less room for the obvious 'end on honours' that we used to know. Indeed, it is one of the reasons why the University of Melbourne has done what it has done. What the impact of that will be on our capacity to bring in students from the European Community is still to be determined. If it has a negative effect, we will look at how we too make adjustments—not in the way Melbourne have; they have gone about it in a different way, which they could do and we could not. But the length of time for a degree and what the degree is would be things that we would probably end up having to examine.

CHAIR—You might have partly answered this. I was going to ask about the nature of the current ARC and National Health and Medical Research Council grants—how they may be effective or be becoming ineffective in the sort of research that is undertaken and whether that kind of culture in giving grants may interfere with academic freedoms, if it does at all. There have been some suggestions that that is the case.

Prof. Chubb—With academic freedom?

CHAIR—Academic freedom in the sense of what you were putting forward, riskier rather than—

Prof. Chubb—More conservative, yes. I think that this whole area needs a radical review. It does not by definition mean that I am arguing for radical change, but I do think a radical review is something we have to do. If the ARC, on average, funds 65 per cent of the research costs and the university has either got to bear the rest or do 65 per cent either of the quantity or of the quality—assuming that you can draw that longbow—as a consequence of that funding, is that good? I do not think it is. And that is done in order to keep the success rate at one in five. Is that good? I do not think it is strategic, because the money that then comes in comes in in packets determined by somebody else's evaluation of the quality of the program. In fact, even that blurs your capacity to be strategic internally.

ANU gets roughly one in three from the ARC. The average nationally is one in five. I do not know which two will miss out, so I cannot say we will work only in this area and the rest of you cannot apply. I would be sinking to the deepest area in Lake Burley Griffin at midnight tonight if

I were to do such a thing, so I do not. They apply, a judgement is made and a grant is funded—partially. My current mantra is that we are chronically partially funded for everything we do. We are partially funded for research, we are partially funded for PhDs, we are partially funded for undergraduate programs, we are partially funded for infrastructure, and the assumption is that we can make do. Sooner or later partial funding is just incremental, not even very genteel, decay. We have got to change that.

What would I do with the ARC? Different things, I think. Some things are in the right direction; some things I would change. NHMRC is a bit different; it funds a higher proportion. But even when I was an academic we used to write grant applications knowing that we had done a chunk of the work in order to be able to report something. I think that that has probably become more of an element in it than it used to be in my day, because the funding is tighter, and all those sorts of things put different pressures on it. So, yes, it means that you have less risk. You are more risk averse rather than risk management, risk evaluation.

Prof. Thomas—To add to that, in terms of research training, more funding to the ARC could go to centres of excellence, which are presently funded every four or five years. Centres of excellence allow for more risk-taking because they have a continuity of funding for five to seven years and can attract a lot of PhD students. In areas of strategic importance you can build critical mass in a very, very high-quality research environment, and the evidence is very strong that the outcomes for those PhD students are very good, because they are internationalised right from the start. Most centres of excellence have to have links internationally. Students flow backwards and forwards to centres of excellence around the world. We just do not have enough of the funding going into scale and focus in particular fields. Most of the funds go to discovery projects, which are very important for individuals or small teams, but to also enhance it with centres of excellence is very important. Likewise, with linkage projects, we know that that brings some PhD students into industry, but we need many more of those scholarships with industry—students to move back and forth between universities to break down the barriers between industry, government and universities.

Prof. Chubb—That is exactly right. The only thing that I would add is that—and the arithmetic is pretty simple—the centres of excellence initiative are strategic and give you some flexibility, and you can do things that are a little more different. I support them unequivocally. But the arithmetic is simple. If a PhD candidature is three to four years and a centre has five-year funding, at what point in the centre's life can you take in students without there being an impost later on that is hard to manage? I do not know how we do it at the ANU; I am sure we have a way. But when you think about it the institution has to be willing to take the risk that says, 'Okay; a centre in its third year can take in five PhD students funded off the centre,' but halfway through their candidature the centre's funding is stopped.

Prof. Thomas—In relation to risk-taking, we just have to look at China again and see that centres of excellence are now being funded for 20 years. They are much more able to be flexible and transform their research into key areas.

CHAIR—So they have guaranteed funding for 20 years?

Prof. Thomas—Yes. Five years just removes the potential for a lot of innovation and risk, because, after five to seven years, people are looking for where the next dollar is coming from.

CHAIR—How far behind are we falling in the global intellectual research exchange community? Where are we at?

Prof. Chubb—Five of us probably are still genuinely comprehensive players on the international stage and there are some others in particular areas. So there are less comprehensive but true nodes of excellence in a fair number of other universities, I think. It is that unevenness that I guess is a characteristic now of our sector and the best is, I think, very good—and the best, whether it is in an ANU and comprehensive or a Melbourne, where it is comprehensive, or one of the smaller universities where it is a particular issue, I think the best is very good.

I will tell you a little story. When I was having lunch one day with my colleague from Stanford, he asked what kept me awake at night. I said that I thought the unwillingness in Australia to fund selectively and at an adequate depth would mean that Australian institutions would move aside and other countries, funding in depth and selectively, would take their place—in particular, China. I have been a China watcher and visitor now for 23 years, and the difference is just unbelievable. It is almost incomprehensible that this university could turn from what it was in 1986 to what it was in 2006. It is just extraordinary. And there is the attraction of expatriates back through facilities that make you cry. He said, ‘It keeps me awake at night too.’ I said, ‘What are you doing about it?’ He said, ‘We are building buildings on the Chinese university campuses because we are in it for the medium to long term.’ Can we do that? No way. So I asked him, ‘How much do you get out of your alumni?’ He said, ‘\$1.3 million.’ I looked down and said, ‘I got \$100,000 last year. It cost me \$30,000 to get it.’ As I looked up, his eyes were sticking out and he said ‘Oh, no, I meant a day.’

CHAIR—A day?

Prof. Chubb—Yes. This is the world that they play in. They can selectively invest because it is their money. A lot of it is discretionary. The university can say, ‘We will do this with that, and that with that and build this.’ It is a magnitude different from the way in which we operate. Ours is that peculiar mix of many Australian characteristics which some other countries share and get over and some other countries do not share and some other countries do not care. They just say, ‘We are going to have nine world-performing universities and we will invest squillions in them.’ That is China. Germany has said, ‘We have spread things too thinly and haven’t got any coordination, so we will invest in nine through a very rigorous process.’ They will not just put money on the top and say, ‘Go away and do something with it.’ They will say, ‘What are you going to do for it?’ The UK has put in a huge amount of money to support research and the direct and indirect costs of research as well as the project costs and staff. The French are now beginning to organise structurally. It is a different world and we are aware of it; we watch it. In different ways and to a different extent we play on the stage, but for how much longer?

FRAN BAILEY—I will pick up on a couple of the points that you were just making. I am a great supporter of centres of excellence. I represent a very large regional electorate. I feel very passionately about the kids growing up in regional areas getting access to affordable tertiary education. But being part of this inquiry has really opened my eyes. Do you think that we have too many campuses and that, because we have too many, the pie has been cut into too many slices? Or is it that we are just not targeting the funding sufficiently and we are trying to be all things to all people at too many locations?

Prof. Chubb—I think that is the issue. I would argue that the number of campuses should be reduced. That is certainly not politically feasible but it is probably not practicable either. Having young people moving simply in order to get access to that education is a thing that Australia has never really been supportive of. I think what we have not done is be willing to look at the linkages between institutions—short of a merger. I am not arguing about merging and all that rubbish. That would be 1988 revisited 20 years later and it would be largely fruitless. The Group of Eight put forward in a submission to Bradley’s review the notion of a system where you have two or three institutions of different types planning to be different and not all saying, ‘There is a teaching and research nexus and therefore we must all do research.’ At ANU, I can tell you, 90 per cent of the staff do research and I can bring you the evidence to show that. In some institutions, it would be more like nine per cent. I do not know what effect that has on the other 91 per cent in the context of the teaching research nexus.

I think we just need to rethink what post-secondary education means—not to say, ‘University X is in a regional area of Australia and therefore stops at this level,’ but instead, ‘That institution might prepare people to come to a university over here which is more comprehensive, offers a different suite of programs,’ or whatever it might be. We need to establish these formal linkages where you get esteem within the system because you recognise you have different roles and they are all important; link vocational education into it; and provide access opportunities for people who, for whatever reason, did not get to the point where they either felt comfortable or achieved what they needed to get into an institution. I think we could come up with a really interestingly different organisational arrangement which protected the regional provision but did not mean that the regional provision was comprehensive. It might well be specialised according to the region, and an ANU might send students to a region because, ‘It’s not our region; we don’t do that.’

FRAN BAILEY—We went to JCU recently, and that is a world centre of excellence in marine biology and tropical medicine.

Prof. Chubb—ANU will not be doing that, so it might be sensible for us to say to them, ‘We will look at preparing some students who can enter into your programs as a finishing point.’ And we do things they would never do. We have probably the biggest physics establishment in academic Australia right now. Why would you try and build another one or have a penny-ante one somewhere? You might as well say, ‘Let’s organise to get people who are really interested in that to come and finish their program at the ANU.’ If we talked about that sensibly and took ego and Napoleonic tendencies out of the vice-chancellors then we might actually get some sensible structural arrangements that meant people would get better provision because they could get concentrated provision.

FRAN BAILEY—Do you think the only way that sort of model could be achieved would be for government to lead because if we wait for the vice-chancellors to all sit around the table and reach an agreement we could be waiting forever?

Prof. Chubb—Even when you only have three sitting around the table you could wait a long time, so I think the answer is yes. I think the government would have to make it clear that they were not going to interfere with, as it were, structural arrangements or independence in that sense. In other words, it would not be another way of having a merger round, although there might be some who would want that. It would not be a merger by another name. You would be

asking to pick the eyes out of the best of the US system, which runs on systems, such as the California system and the New York system. These are organisational arrangements between institutions doing different things, but knowingly different so they get an outcome that is much better. It costs you money, time and energy to do that—I think I was quoted in the paper yesterday saying you would not even do that unless you knew the government was going to support you in principle because you would have to invest a lot to get to the point where you had something it could invest in. On the other hand, I am quite conscious of the fact that an Australian government is unlikely in my working lifetime to put more money into the universities simply because we say we need more because we have not got enough. Any government would say: ‘Well, if we do, what will you do for it? What will you do in return? What will you give us back?’ I think a better sector is what we would give back and it would be possible to do that.

CHAIR—Thank you very much.

Prof. Chubb—Good luck.

Resolved (on motion by **Ms Bailey**):

That this committee authorises publication of the transcript of the evidence given before it at public hearing this day.

Committee adjourned at 11.59 am