REPORT OF PROCEEDINGS BEFORE

STANDING COMMITTEE ON STATE DEVELOPMENT

INQUIRY INTO SCIENCE AND ITS COMMERCIALISATION IN NEW SOUTH WALES

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At Sydney on Monday 8 September 2003

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The Committee met at 9.00 a.m.

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PRESENT

The Hon. T. S. Burke (Chair)

The Hon. A. Catanzariti
Mr I. Cohen
The Hon. P. Forsythe
The Hon. M. J. Pavey
The Hon. C. M. Robertson

DOREEN VERONICA CLARK, Vice President, Academy of Technological Sciences and Engineering, 19 Parkwood Grove, Pymble,

JOHN GILMOUR NUTT, Chair, New South Wales Division, Academy of Technological Sciences and Engineering, 153 Burns Road, Turramurra, and

CHRISTOPHER GRAHAM ROBERTS, Fellow, Academy of Technological Sciences and Engineering, 51 Bushlands Avenue, Gordon, sworn and examined:

CHAIR: I welcome Dr Clark, Dr Nutt and Dr Roberts, all of whom represent the Academy of Technological Sciences and Engineering. I will first address the many members of the media who are present. The Standing Committee on State Development has previously resolved that the press and public be admitted to proceedings of the Committee and that the media may broadcast sound and video excerpts of its public proceedings. I point out that, in accordance with the Legislative Council's guidelines for the broadcast of proceedings, only members of the Committee and witnesses may be filmed or recorded. People in the public gallery should not be the primary focus of any filming or photographs. In recording the proceedings of this Committee, the media must take responsibility for what they publish or what interpretation is placed on anything said before the Committee.

I advise the witnesses that should you consider at any stage during your evidence that certain evidence or documents that you may wish to present should be heard or seen in private by the Committee, the Committee will consider your request. However, the Committee or the Legislative Council may subsequently publish the evidence if they decide that it is in the public interest to do so. Do you wish to make a brief opening statement prior to questioning?

Dr CLARK: Each of us would like to make a brief statement and then proceed to questioning. I would like to make a brief introduction to the Academy of Technological Sciences and Engineering. It is one of the four learned academies in Australia—the others being science, social science and humanities. Our fellows, who number about 670, are elected to fellowship because they have been successful in implementing some major technological discovery or system. They cover a very wide range of business, scientific and engineering activities. When the academy saw the request for submissions to your inquiry we got together a group of about half a dozen fellows, and the document you have before you is the result of collaboration between us. We are very pleased to have the opportunity to elaborate on it and look forward to your questions.

On a small personal item, I am an industrial chemist and I suppose you could say a technical entrepreneur. In 1969 I set up a business based on chemical testing and operated that business for almost 30 years until I sold it—at great personal advantage, I must say—in 1998. Since then I have been engaged in my great hobby, which is attempting to promote the teaching of science and technology in schools, particularly primary schools. The academy is very interested in innovation and entrepreneurship and over the past 12 months has held a series of four seminars that promote that idea. We have supplied in our submission the proceedings of those events.

Dr NUTT: I would like to set the background of our submission to this inquiry and to tell you a little about myself. I have been a consulting engineer for all of my career and I have been involved in innovation for almost all of that time. I graduated in Queensland and as a young engineer I was lucky in that my professor got me an appointment at the University of Manchester as a staff member and assistant lecturer. I was there for five years. Manchester was at the forefront of the introduction of computers. They claim—I think it is probably quite right—that the computer as we know it was invented in the research laboratories there eight years before I arrived. I then joined a firm where I spent 40 years. I came back to Australia to work on the Sydney Opera House. I have been involved in the construction industry and in development. I ended up as a global chairman and chairman of Australian practice for 25 years.

The Committee is inquiring about innovation and the commercialisation of science. That delivery of technological innovation is adding value; it is much more than just science. I know that science is used as a shortcut to define what the whole process is but by far the largest part of that delivery process involves a range of skills other than scientific skills. It involves ideas, methods and products and a degree of entrepreneurship. Entrepreneurs have a bad reputation in this country—we

think of some from the west who are probably still in gaol; which is where they should be. We think an entrepreneur is somebody who takes a risk and champions the cause of production and innovation and sees a little further than most others, who do not. That is one of the points we would like to make. The process of technological entrepreneurship involves an attitude of mind and a range of skills much tougher than the scientific idea. So a person who is an entrepreneur must be a determined champion and have as well as persistence and resilience, judgement and experience. Those people are very special people.

We have held four seminars in the past three years on innovation, the first of which was about commercialising innovation. The seminars continued until last week, with a seminar on how to select, train and educate technological entrepreneurs. Our academy has incredible networks and we are able to bring together some excellent speakers, who by and large come out with the same sort of message. I will try to distil that message; we have tried to put some of it, but not all, in our submission. I will give a couple of quotations. Robin Batterham, the Australian Chief Scientist, appeared at one seminar, and said:

> … the … innovating culture—

that is the word he used—

> in Australia needs strengthening … (and proposed a) target increase of 10 times current effort.

That is significant. One of our speakers at the conference last November was Lord Robert May, President of the Royal Society in London and an Australian—I think that is why he came. He said:

> In industry R&D, Australia ranks very poorly.

He put that statement in context. That lack of entrepreneurship and the lack of delivery of technological innovation is a recurring theme, not the science. The science is in abundance; we have some extraordinarily good scientists. But we are not good at taking it through to commercial production so that we get the benefit for Australians.

That is why the academy takes a strong interest in this particular topic and we have devoted ourselves to it. What can governments do? If I can put both personal and organisational things. For a start, excellence is important. There has got to be excellence in the scientific idea and in all stages, and you do not muck around. There is enough evidence to show that mediocre ideas do not get up but good ideas have a strong chance of getting up. Part of the role of governments is to help identify what those good ideas are and to smooth the path for organisations that are doing it.

The second thing is it has got to be enthused in a business or in a community. The culture of both has got to encourage that innovation. In other words, if you run a business and you are only concerned about efficiency, you eliminate all the potentials for failure and you cannot introduce new ideas unless you are willing to accept that some of them are going to fall over. You have to encourage people to take that risk, and often it is at their own personal expense. In the private sector—they might have their houses on the line or their mum's and dad's houses might go on the line to facilitate it—you have to encourage that culture and not condemn the failures that will occur but give them an opportunity of picking up. Governments ought to be able to encourage it.

There is a shortage of capital at certain stages. That does not mean to say that governments are not providing an enormous amount of money but it might well require some distribution into the process because Robert May said it costs $1 to get the scientific idea and it costs about $10 to get it up to determining whether it is commercial, and it costs about $100 to get it into production. So if you relate each dollar, that is time, and it is generally people's time and effort. I have said that the leaders of the innovation process are special and they need to be encouraged. In my firm I put young men and women into new disciplines, into new countries, into new offices, and you believe that they are going to succeed, and they will go through periods of depression because they wonder why you have done it and they are not successful. But if you are any good and if you have made the right selection they will come through. So somewhere you have got to take your champions and you have got to nurture them through that down stage when they even have self-doubts. I think part of the exercise of leadership is to do that. That is corporate leadership and national leadership.

I have been chair of the New South Wales division of the academy for two years and I spent two years on the committee before that. Like Doreen, I did it after I had retired from business. I retired from my firm in 1999. When I ask our members about the role of the New South Wales Government—and I have the utmost respect for them because they are people of eminence—I find expressions of disappointment. I know it is not all bad. I know that those expressions are good and they recognise it, and that what the New South Wales Government is doing for the research and innovation committee is good, but they compare us with Queensland and Victoria. Now I see New South Wales as the premier financial State. Some of the motivation undoubtedly in Queensland and Victoria is to compete with New South Wales to take away some of the new industries that could develop in New South Wales and make them their own. I believe that New South Wales should not be worried about that. We live in a competitive environment but what we should be doing is looking forward and comparing ourselves with the best in the world because if we are the premier financial State we are driving the Australian economy. Australia has got to compare itself with the Irelands, the Finlands, the Singapores of this world. One of the things that Lord May said when he was here is that innovation is easier to lose than create. I believe that it is absolutely right, it is easier to lose.

So we should aim higher than we are doing at the present time. One of our roles in coming here is to encourage the New South Wales Government to do that. The benefits are significant and I think you will recognise them. It would be a vibrant environment. You get world-class researchers here, you get the entrepreneurs, you get more jobs, you get a whole range of things, I do not need to go through these. We welcome the appointment of Mr Sartor as the Minister for Science but he has also got a big portfolio and we would suggest that this is so important in the longer term that it deserves a portfolio in its own right.

If we are going to change the culture of New South Wales I think it has got to come from Cabinet. I think that Cabinet has got to embrace it in the way the other States have, and that involves the Premier through the office of the Cabinet and through the Government. There is lots of perception in it but we think that there is a need for a properly considered policy. In business we would call it the strategy plan, to redirect some of the money that you have. There are lots of things I believe that you can do which would not cost much money but it would start to raise those perceptions and give encouragement to the wider range of people out there. So we have put down four recommendations. We think that there is a need for a highly regarded corporate spokesman on science, the other States are starting to do it and the Commonwealth has done it. That is the background to our submission.

Dr ROBERTS: Thank you for the opportunity to be able to make a few comments to your committee on this most important topic of commercialisation of science. I also come from a commercial background—27 years in commercialising medical devices and taking medical device technology to global markets and in the past 10 years I have been involved with ResMed which is taking some technology developed out of Sydney University for the treatment of obstructive sleep apnoea—snoring gone mad—to global markets. In the decades that I have been involved in commercialising science—although I like to call it globalisation of technological products—a couple of points have come home to me.

I would like to reiterate the previous point that was made: the difference between science and technology, that science is the knowledge and technology is the application of that knowledge. I want to use the word "technology" a little bit more than just science. But the three points I would like to make are the following: first, that technology drives economic growth. Technology is the turbocharger for economic growth for a country as well as for a company. It has been studied for many years. Robert Solow from MIT won the Nobel Prize in economics for his understanding of what drove economic growth in the United States of America for 100 years from the mid-19th century to the mid-20th century. He looked at why per capita income quadrupled in those 100 years. He found that increased inputs, namely, extra labour and extra capital contributed only about 15 percent of economic growth; the rest of it, by and large, was technological innovation. Robert Solow's work has been further built on by people such as Ralph Landau and others. So it is clear that if you look at success in countries like the United States of America, it is technological innovation that has driven that.

The second point I want to make is that what we are talking about here is something much more fundamental than the sort of linear model of science, the linear model of commercialisation of science which is a model which has certainly been popular in Great Britain and to some extent accepted in Australia. The linear model of science—the simple model—says that you take these

brilliant scientists, you create an environment and support for them to do their work and they will come up with unexpected discoveries that are picked up by technologists and engineers and turned into products and processes. The linear model is commercialised like that—and it does not work, it is dead, there is no evidence for that model. Commercialisation of technology is driven from the market. The ugly facts are that 90 per cent of all technological innovations actually come from the market. They fill a market need. It is not finding some you-beaut invention per se.

The third point I make is to marry the first and the second points together. That is, that what we need is a society with broad receptors of understanding throughout society of science and technology and by "society" I mean the public policy makers through to the commercial people. It is not that we do not have good scientists, we have some of the world's best scientists in Australia. That is not the issue. What we need is a general up skilling of the scientific literacy in our community, from business people right through to policy makers, policy advisers and the like. That starts with things such as education—coming back to Doreen's incredibly critical point—if you do not commit to science education starting from primary school going through to secondary and tertiary education, all bets are off; you will never end up with a knowledge-based economy and a technologically advanced society. It has got to start with that; so we have to up skill the community.

At the end of the day commercialisation of science is all about up skilling the broad scientific literacy of the community in general, and getting them to understand and embrace that technology is the turbocharger of change; that it is really the driver of economic growth.

CHAIR: Thank you very much. Most of the questions I will just direct generally and if you could work out between yourselves who will answer? Page 3 of the submission calls for both the Premier and the Cabinet to lead the drive towards commercialisation. I am just wondering to what extent is the bio unit which exists within the Cabinet office the sort of the initiative you are referring to there. I know it is limited to biotechnology but to what extent does it perform that sort of role?

Dr ROBERTS: You hit the nail on the head when you said that: the biounit is biotechnology. What we are talking about is something so much broader and so much more fundamental than that. The biounit is great, but 5 per cent is what we are talking about.

CHAIR: In terms of that little circle—?

Dr ROBERTS: In terms of what it can do in biotechnology, I think it is a step in the right direction. There is a committee on biotechnology. I think that is one of the terms of reference you are looking at, the Bio*First* program. Without telling you your business, if I were the your Committee I would be going back to that advisory committee and really understanding what they have been suggesting to the Government, and if they have been suggesting anything asking why that has or has not been picked up by the Government of the day. I think that concept for biotechnology is the right direction. But what we are talking about here of technology is the driver in economic growth. It just needs to permeate everything; it is not something that is there in biotechnology.

Dr CLARK: If I could add to that. I was a member of the New South Wales Innovation Council or four years, and during that time I do not think we produced anything of any value. The Bio*First* initiative happened over there, without really any consultation with the Innovation Council. And I am sure there are other pockets of very good work going on all over the place, but nobody knows what is happening in other places. So the notion of some co-ordinated office within government that actually knows who is doing what to whom around the place would be a very valuable thing, to get that coordination right, so you are not doing things twice or having people beavering away very diligently but not seeing the big picture.

CHAIR: I think recommendation 11 refers to bringing Australians back from overseas. One of the programs within Bio*First* involves rewards to bring emerging researchers back from overseas. How successful have you found that element and the method that has been used within Bio*First* to bring people back from overseas?

Dr ROBERTS: I cannot specifically comment on that process.

Dr CLARK: We really have not been involved with Bio*First*. I received the documents, which were substantial. I understand that the program is in the beginning of its development and there are some good mechanisms laid down, but I do not think any of us is familiar with it in enough detail to make a sensible comment.

The Hon. PATRICIA FORSYTHE: Dr Clark, how do you believe the New South Wales Government could improve co-ordination between government departments in the commercialisation of scientific research?

Dr CLARK: I think you have to have an agency whose job it is to do that and whose membership would at least have a database which showed what was going on. There could also be some cross membership; perhaps the central agency could have a person on each committee. But all of that would be as of nothing if the Government does not believe that it is achieving something by means of that co-ordination. My experience with the Innovation Council was not really very encouraging. Our Minister passed through once I believe, or maybe twice, without actually leaving a shadow. Even getting the head of the department to come along on a regular basis was difficult. The budget was sort of there, but when you actually wanted to spend it, it went away. It just did not have any oomph, push, guts, or whatever you want to call it.

So it is no use establishing an agency unless it really has the interest of Cabinet or some driving force within government and is seen to be really important to New South Wales developments. State and regional development beaver around all over the place. They have officers in the country and the city, and those officers do a very good job; they assist local entrepreneurs to get up to the next stage, but the overall leadership is missing.

Dr NUTT: As I said, I have come out of a particular market sector in consulting engineering, essentially the construction and planning industry. But the academy is wider than that, and it embraces all the technological sciences and the like. I found that there is a common overlap between many of these different market sectors but the basic generic issues are the same, whether it is in ICT or bio-med, biotech, product services and manufacture, or ideas and design. And each learns from the other. To bring those together under one umbrella would be a very positive dissemination of experiences from one sector to the other.

I do not particularly want to deal with how one might capture the overseas researchers, but there is no doubt in my mind that Australians, because of the lack of an industry base of any strength here—you can only teach part of it, but you learn your entrepreneurship by sitting in an environment where it happens, and you learn its best if you sit at the feet of a master or champion who has done it well. To send young Australians overseas to experience that in other environments is a very important aspect of it. The key thing is: How do you get them back? I reckon that governments must take that initiative.

I have sent young Australians overseas, and if I am opening an office in New York I say to them, "Go with the expectation that you will stay in New York for the rest of your life." Sometimes they come back. Generally it is the wives who bring them back, because they like the lifestyle, the kids want to be educated, and the like. But there is no reason why a body sponsored or driven by a government should not keep tabs on these people, almost like universities keep tabs on their alumni, and use their alumni for raising and vast sums of money and things like that. It might not cost you anything, and you might do it through your officers, but if you know that those people are there—

I gave an example of Biotech 2003 in Washington. I have no doubt that Beattie and his mates from other States are probably having cocktail parties there, they are talking to the young people and they are saying, "In my environment, I will take notice of you." They may or may not, but at least they are getting runs on the board, and somewhere you have to keep on encouraging them.

The Hon. PATRICIA FORSYTHE: How important is it that the Premiers appear at those conferences? Does it make any difference in reality, or is it important that you have a delegation from the State regardless of who is heading it?

Dr NUTT: Victoria and New South Wales have made a strong play on that. Premiers are busy people. I have always believed that, certainly in business and I suspect in good governments,

they are teams. If you can draw your team together so that there is a strong desire to do that, the chief executive officer does not have to appear at everything.

Dr ROBERTS: Could you talk about BioTech 2003? I think you had that first hand.

Dr NUTT: Yes. As Doreen said, when this came out we circulated all our fellows in the New South Wales division. We emailed out to all of them and said, "This inquiry was coming up. What are the issues that you think are important?" We gave them a series of questions, pretty much in line with those that are part of your mandate. One of our fellows who was over there came back and said, "Yes, we would like to be involved." As the story says, President Bush has just spoken at this and there are 20,000 people there. I think that New South Wales is underrepresented.

The Hon. TONY CATANZARITI: What is your impression of the success of the biounit and the Bio*First* strategy in New South Wales?

Dr CLARK: None of us is really a biotechnologist. We have not had an in-depth experience of the Bio*First* initiative. We did appreciate that it is an initiative, but it is not part of a larger whole-of-government initiative. So I think it bears keeping a very good eye on, and perhaps in your capacity as reviewing the commercialisation of science you will come to understand how those initiatives come out. But I do not think our panel here can make a sensible comment about that at the moment.

The Hon. MELINDA PAVEY: What value do you see in New South Wales conducting its own mapping exercise of the strengths and weaknesses of commercialising science, considering that the Commonwealth has already undertaken a nationwide mapping of science and innovation? What are the gaps that you can identify which can be filled by New South Wales?

Dr CLARK: I certainly do not believe you should try to do it in double form because, from the little I have seen of the mapping process it has been an extraordinarily difficult job that the Commonwealth has undertaken and it has produced masses and masses of files but as yet nothing has distilled out of it. I am really not in a position to know, across the board, what gaps there might be. We have generalised in our submission, we have talked about clustering as a mechanism, and we firmly believe in that. I think John has had experience in clustering as a mechanism of building small and medium enterprises into something more. After all, Australia is absolutely full of small enterprises. I started a small enterprise myself, and to get over the 20 employees barrier is a very difficult thing. I managed to get 70-odd employees at the end of my business development—and that was a very different kettle of fish from being under 20. So if the small businesses can be gathered together and enhanced by using joint facilities and by swapping ideas, I think we will build some technologically based businesses that can advance. But I cannot make a better comment on your question, unfortunately.

Dr NUTT: Certainly when you run a business you have to understand where your strengths and weaknesses are; you have to understand where your competition is coming from. You do not necessarily beat them on price, particularly in my business. In fact, if you go down to the lowest common denominator you are doomed to cut out a lot of the things that make you successful in the longer term. If the Commonwealth is doing it, and I think it is still in hand, there is no reason why you should not pick up and see what is going on in New South Wales. But we, New South Wales, ought to understand that in order to build strategies, unless we know what our strengths and weaknesses are we will not get the right strategies in place. I think it is a fundamental thing. A lot of the information will be there already, and I think it is just that the right questions have to be asked.

The Hon. MELINDA PAVEY: As a general issue you have identified a lack of entrepreneurship as a deficiency in Australia. What are they doing in Finland or Ireland that is different? Are they better putting campuses together so that the economic department is closer to the science department, so you have people with entrepreneurial skills helping those with scientific skills, because generally they do not go hand in hand?

Dr NUTT: Yes.

The Hon. MELINDA PAVEY: Do you have some ideas or strategies there?

Dr NUTT: We could well give you that, and it is pretty well on the public record. In fact, Dr Trevor Cole, who was part of our committee but is in the United Kingdom this week and unfortunately could not attend, has made a study of those. That information is available, and he has certain views on how you do it.

Essentially, my understanding is that Ireland has created it through bringing in new industries through tax advantages. Finland has done it somewhat differently in that they have taken a company that came out of the timber industry. They have started to develop their own home markets and use that as a platform first of all into Europe and then the rest of the world.

Dr ROBERTS: I will add to one of the important aspects of that. In the United States entrepreneurs can come out of a university environment. University staff, lecturers and research professors are encouraged to be involved, from an equity point of view, in start-up companies, or to take a leave of absence and get involved in businesses. Businesses in the United States that start-up are spawned from universities; it is encouraged. If you have been a professor at a university for X years and you have not started a company they think something is wrong with you. The mind-set as to the environment is completely different, who is encouraged and who owns the IP, whether it is the university that wants all these licensing fees or do you want to encourage your staff to take the IP and do something with it. That aspect is terribly important and is one of the key drivers of the success of the United States in starting new businesses.

Mr IAN COHEN: You have painted an interesting picture of Australia with disinterested government agencies and rather crooked entrepreneurs that fail.

Dr NUTT: I do not know that I have said that.

Mr IAN COHEN: It was the Whitlam Government, which injected funding for interest in the Australian film industry, that launched things fantastically and we will all beneficiaries of it in terms of Australian culture. Can you see some way of capturing the public imagination between the private sector and the Government? How do we kick-start the area where the start-ups are failing? Could there be some government scheme to address that gap. Your mention some successful models overseas. Are we dealing here with a culture problem or is it essentially a funding problem to kick-start the whole operation and generate enough interest? Finland and Ireland do not have the long summers that Australia has. Is it part of our culture that we should look at how we deal with this. The conditions, opportunity, pay and resources are so much greater in the United States that we are losing those young people all the time.

Dr CLARK: We made a point in our submission that we feel education, starting in primary school, is a really important thing.

The Hon. PATRICIA FORSYTHE: Can I just interrupt? How has the New South Wales education department responded to your submissions and the desire to get science—and technology is a far better name—for the classroom to get kids involved. How are you going at the moment?

Dr CLARK: Not too badly, I have to say. I am quite optimistic and I bother the deputy director-general of school education on a regular basis. I am a member of the board of TAFE and I go in and out of the department. I had an appointment the other day with him. Education has a certain momentum. They do literacy, they do numeracy, and science and technology is coming up. They will have a full review. They have an excellent K-6 syllabus, which embodies design, make and evaluate. It is a really good syllabus but they do not have any teachers to teach it. The universities are not training people in science and technology electives. I will not go back to that story because it is a long story because they do not have enough practical work to do it.

The New South Wales department has a series of 20 consultants, who have been working for two years using Commonwealth money to do an in-service program for training teachers. Consultants come out to schools and tell the teachers how to do it. Sadly, we are having a giant rearrangement at the moment in that the education department has to save $70 million. There is a review going on and it is all a bit of a turmoil. The reason I went in the other day was to try to find out what is happening to these 20 consultants—it is a micro issue in the grand scheme of things—and I was assured that the embedding of science and technology in the new system, whatever it turns out to be, will continue.

I know that the deputy director-general of schools understands it, wants to do it and is working within his limitations, but he is not currently employing teachers into primary schools that necessarily have the skills to teach in the science and technology area. The university is not pressing it and the schools are not making it a condition of employment, so the teacher cohort coming through is not likely to be much better than the cohort that came through 10 to 15 years ago. At the moment we need to stress teacher training at the new teachers institute where qualifications in science and technology may be mandated for a particular kind of employment. I am going to write him a letter, which he encouraged me to do, suggesting he employs a quota of people with the proper electives to go into the system at the moment. In answer to your question, they are doing something but, as always, one could do more.

Mr IAN COHEN: That is in education. Looking at the long-term resolution could a government-funded scheme address that gap in the short term in what seems to be an acute situation? Do you see a design or are there only successful models in addressing that group through to the concept stage?

Dr NUTT: I will comment on both those points because I think they are interrelated, and one is totally personal. Most people who get involved in physical sciences or engineering have been influenced by somebody at the school. Generally it is a good master or mistress and good people can inspire. But that is a generational thing. That will take us two generations to get there if we start now.

The venture capitalists are finding, and two made this statement at our last conference in November, that because of the changes in the laws, superannuation funds and things like that, there is a significant amount of venture capital around. The problem is that generally an idea takes about 12 years—it is a frequently mentioned time; to get an idea into commercial production is about 12 years and the scientific ideas get up to the $10 commercialisation stage in about three, or it might be four. But the venture capitalists do not want to come in and they are willing to pay the extra price at 12 minus three. Bill Ferris, who runs Champs, and Jeff Brooks, who runs Rothchilds, and others of note have all said that. There is a fair amount of venture capital money but it is always at the latest stage when the market has been proven. There is that gap in which people get the idea up to a stage and then they struggle to get through. How do you overcome it? It probably means that you have to redeploy.

Doreen, and I think Chris, touched upon the fact that universities have been modelled on the British system and in the past they have discouraged practices outside the university by staff members. I saw a difference when I came back to Australia 30 to 40 years when I tried to get advice on the Opera House from various engineering departments whereas in London, where I was working, they were doing it and we were paying them money. Because of that a lot of our ideas come out but they are fragmented and they are too small. The venture capitalists are saying that it is not the number of ideas that are coming out and getting up but they cannot find people to drive those ideas that they would trust.

Jeff Brooks of Rothchilds then said, "I have six CEOs in California and six in Australia", and he described the characteristics of each but they were different. Each of those in California had worked in large companies. They had been responsible for product lines and had known the business side of it; they understood the need to both introduce and deliver it. Whereas, in Australia we have a very strong service industry but service industries are different, with all due respect Mr Chairman—and in a way I was in the service industry as well—but in the service industry you advise all the time and other people take their decisions. Somewhere we have to get people in those entrepreneurial positions who are willing to take their decisions.

The Hon. PATRICIA FORSYTHE: We have seen in Australia in the last few years a significant shift away from manufacturing.

Dr CLARK: Yes.

The Hon. PATRICIA FORSYTHE: We have lost a lot of people out of manufacturing. It is often said that is because of our wage level in that we cannot sustain the industry efficiently versus countries with lower wage levels. Given the drop in manufacturing, is that one of the reasons why so many people have gone offshore. For example, with heavy engineering in Newcastle, where there was

a lot of money in years gone by because BHP had its own laboratories. Those things are no longer there. Is that having an impact on scientific engineering?

Dr NUTT: Resmed has been one of most successful high-tech innovative firms in Australia in the past 15 to 20 years, so Chris should answer that question.

Dr ROBERTS: It is true. You can manufacture here and compete if you are on top of the basis of competition, which is changing and, by and large, if you are adapting new technologies. Where people lose out is when they are technologically outsmarted. It comes back to the chronic problem versus the acute problem. We can put some of these programs in place, which are useful, but it is a bit like mowing the lawn while the house is burning down. Governments must understand the importance of getting the education right and do not underestimate the importance of people like Dr Karl, the Sumner Miller professor of physics at Sydney university. That guy has an unbelievable influence on kids doing science in a very positive way. I have four teenage daughters and I have struggled to get their imagination captured in science because of the way it is taught not because of what is in the syllabus.

Dr CLARK: Australia does not want a low wage, low skill economy and if you are manufacturing things that can be more cheaply manufactured in other places by exploiting the population, that will happen. We recommend that we build companies that have higher skill and have permanent jobs where the skill embodied in the staff is valued, not where the staff are throwaway items that can be called up for a half a day or two days a week. We need those small, technologically based companies to grow and grow staff with them so that we have higher technology jobs. That does not mean you have to be a rocket scientist because on the floor at factories now, the operators work computers. They organise a whole lot of stuff with screens, panels and touch screens. The kind of employment we had in the past may well disappear but the kind of employment we need to the future is something we all have to work on.

Dr ROBERTS: I make a point on manufacturing from ResMed's point of view. It was Australia's exporter of the year last year so we are a major exporter. We have a major commitment in New South Wales. We are out at North Ryde but we have just bought 12 hectares out at Norwest Business Park and we are building a two-hectare building at the moment, which is a manufacturing building. We are competitive worldwide to manufacture here in New South Wales. The reason we are competitive to manufacture here is that our activities are driven by a very strong research and development activity. We currently have about 250 people in research and development type activities.

We need that activity very close to the manufacturing. You could take manufacturing to some place in the world where the labour rate may be cheaper, but you would not be able to do the quality research and development—and we need research and development and manufacturing together. That is why we are able to be competitive. It comes back to having a critical mass of skilled people in sciences and engineering.

Dr NUTT: I could go further. It is almost a systems dysfunction. One thing that is commonly said is that the Australian industry research and development is very low. Even if you drive new start-up companies, you have to ask: why is it that our established base is not investing in research and development, so you do not finance that research and development out of an equity share raising, which has a certain quantum about it that is invariably tight, and a certain time about it. Invariably they spend most of their time going back and trying to get more money. As a firm, we always financed it out of profits. In other words, we make a surplus and we invest a proportion of that into our business, so we capture the benefits 10 years down the track. In that process we have either established another three or four new businesses—which might be our core business in 10 years time—but why is it that Australian industry spends so little on research and development? I do not know the answer.

The Hon. CHRISTINE ROBERTSON: It was very interesting when the Federal Government offered quite amazing tax breaks for research and development that the majority of it went on so-called education for the higher echelons of the business world. Pages two and three of your submission state the there is a widespread perception among industry participants that the New South

Wales Government is a follower rather than a leader. How is that perception justified? What do you think can be done to fix it?

Dr NUTT: You did not give us much time to respond, if I might say so. We heard about it about three weeks before we put in the submission.

The Hon. CHRISTINE ROBERTSON: That was bad timing.

Dr NUTT: So, rather than trying to drive statistical information, we said that we would approach it in a somewhat different way. We would approach it on anecdotal information. The Commonwealth is finding precisely the same problem when mapping industry research and development; it does not get inside corporations, does not really know what is happening and is having to rely more and more on anecdotal evidence. We circulated all of our members and we got some submissions and talked to them over the three weeks. We reckon that they are at the upper echelon; in other words, they would know better than most what was going on in a State or the nation. They have either led businesses or they are involved in the research process or in academia. My impression, which is totally academic and anecdotal, is that when you mention New South Wales they reply, "Not up to scratch".

The Hon. CHRISTINE ROBERTSON: What needs to be done to rectify that?

Dr NUTT: What we have suggested—and what I would try to do in my business if that were the case, and I led a consulting firm for 25 years and was global chairman—is that the leaders start to say "This is worthwhile. You establish networks, you establish communication, you put forward your priorities". They ask, "What are you doing in this field?" For instance, in my firm, we sent a man around the world a couple of years ago to find out the most innovative thing that Arups have done worldwide. We were the designers of the wobbly bridge; and that illustrates the difference with innovation. When we asked, "What is the most innovative thing that you have done in this office" a number replied, "Fixing the wobbly bridge."

I got cross with them and said, "No. The wobbly bridge in the first instance was the innovative thing, because it was different from any bridge that had ever been built. It was a question of human behaviour that had never been experienced. As soon as you know the problem, fixing it is dead easy." You actually put priorities and say, "These things are of value."

The Hon. PATRICIA FORSYTHE: You have talked about normal decisions of business. Where does government fit in?

Dr NUTT: You are the leader of our society, ma'am. Business means that a group of people can actually do things, in my case because we like to do it. It keeps body and soul together so you can eat breakfast tomorrow.

The Hon. PATRICIA FORSYTHE: What do you expect of government in its relationship with business?

Dr NUTT: Government should have a deeper understanding of the strengths and weaknesses of a community than does business. It should have a wider remit to the wider membership of the community and not just the shareholders or the workers within a particular industry. If, as Chris said, technology is such an important thing to control, our future governments have to be totally involved and be willing to encourage it.

Mr IAN COHEN: Is there a problem with a government's short-term responsibility, the three or four year projection?

Dr NUTT: Yes, I think that is part of it and you could well say that part of the problem with industry is that many institutions that make up the majority of our public companies, such as super funds, are reporting on very short terms. Some leaders have established the principles of investment that do not yield returns for 10 or 20 years. Good leaders can do it, I have seen it happen.

The Hon. PATRICIA FORSYTHE: Is the public money that is expended on commercialisation in New South Wales having the appropriate impact? If not, why not?

Dr NUTT: You are closer to government that I am; government has to help the community find those issues and how it best expresses itself.

CHAIR: One proposal in your submission is about clustering. Could you explain how you envisage a system of clusters operating, and how it may or may not interact?

Dr CLARK: There is an initiative in Western Sydney that concerns toolmaking. The chap who started it, a migrant to this country, is a specialist toolmaker. He tried to gather around him a group of other toolmaking companies so that together they could invest in infrastructure which would allow Australia to produce patterns. In that instance, clustering is a sharing of infrastructure for mutual benefit. In order to make it work, you have to overcome the distrust of individuals, one for the other, normal human being matters. That initiative has been on the books for quite a number of years. I know it was involved with one TAFE institute to train-up apprentices, and so on. That sort of thing has taken too long to get going.

The Australian Technology Park [ATP], very nicely funded in its establishment, is now more a real estate activity than a technology park. The Sydney Harbour Foreshore Authority took over under circumstances that were probably less than ideal. The technology-driven aspect to it has not gone by any means but is subjugated to the idea of an industrial park; a real estate type of thing. We started some really well and there are initiative is about. The Office of Western Sydney is a great organisation which brought together many firms to share knowledge. Clustering is in effect the support of self-help groups. As I understand it the ability to fund infrastructure for those groups is not covered by the Commonwealth or by the State. Our fellow who advised on that topic thought that the State could step in and make clustering a priority in some of its support mechanism.

The Hon. PATRICIA FORSYTHE: It has done some in the Hunter. Are you aware of that?

Dr CLARK: Yes, the Hunter is going well. Newcastle is a great example of a place that has certainly made amazing gains, having lost disastrously the heavy infrastructure. Probably in the end they will be glad that the heavy stuff went away and that other things have come together. In the meantime it is a struggle.

Dr NUTT: I will amplify that answer about clustering. I have heard of it from a number of sources but not from the Office of Western Sydney. For instance, did you know that there is a small firm in New South Wales whose technology goes into one-third of the motor vehicles of the world? A group called Bishop Technologies, an engineering firm, manufactures steering systems. It has a joint venture with Mercedes-Benz in Germany. I know it is looking at how to take its ideas—and it has invested a lot on research and has a lot of strong patents and the like—and sell its technology to manufacturers in North America. Also it has to keep ahead and it would welcome clustering in which it could share matters such as cold forging of steel; highly skilled technology and things like that. These groups exist and if you could bring them together it would not be a formal relationship but an informal relationship in which it has a diverse range of skills. People would spend their lunch hours or social occasions in informal networks to develop new ideas, because of somewhat complementary skills.

The Hon. PATRICIA FORSYTHE: The Government would not need to be involved in informal relationships. I would have thought that the formal TAFE example you used would link it with education. That would ensure adequate subject choices and skills through TAFE or universities.

Dr CLARK: Yes, it certainly would be helpful if, for instance, a cluster developed around toolmaking and the neighbouring educational institutions supported that with specialist courses so that the apprentices did not have to travel across to the other side of Sydney to do their courses.

The Hon. PATRICIA FORSYTHE: Is that a fair role for government?

Dr CLARK: Yes, it is certainly a major role.

Dr NUTT: It is totally local. Clustering is not national, necessarily. The ATP was an excellent example initially.

(The witnesses withdrew)

KERRY CECILIA DOYLE, Director, BioUnit, The Cabinet office, Governor Macquarie Tower, Sydney, and

JOHN LANCE SCHMIDT, Deputy Director-General, The Cabinet Office, Governor Macquarie Tower, and

KATY SARAH READE, Senior Policy Officer, The Cabinet Office, Governor Macquarie Tower, affirmed as under.

CHAIR: In what official capacity do you appear before the committee? Do you appear as a private individual or a representative from an organisation?

Ms DOYLE: As a representative of the Cabinet Office.

Mr SCHMIDT: As a representative of the Cabinet Office.

Ms READE: As a representative of the Cabinet Office.

CHAIR: If you should consider at any stage during your evidence that certain evidence or documents you may wish to present should be heard or seen in private by the committee, the committee will consider your request. However, the committee or the Legislative Council must subsequently publish the evidence if they decide it is in the public interest to do so. Do any of you wish to make an opening statement?

Ms DOYLE: I thought I would briefly describe the Bio*First* Strategy and the unit. As people may be aware, the Bio*First* Strategy is a $68 million five-year program. It has four major components: BioPlatform, being the research component; BioBusiness basically being the commercialisation component; and BioEthics which is to look at the ethical underpinnings of biotechnology, raise awareness, look at policy and legislative frameworks and the estabishment of the unit itself. The strategy was announced in August 2001. Some officers were immediately recruited to the BioUnit to commence work. The unit probably became fully operationally towards the end of 2001. As well as primary responsibility for monitoring and oversight of the strategy and its co-ordination and the development of new initiatives as appropriate, we also take care of the policy and legislative underpinnings relevant to biotechnology.

CHAIR: What opportunities does the Government's Bio*First* provide for commercialisation for research and discoveries?

Ms DOYLE: As set out in the strategy, there is a range of supports to research to help build a critical mass of excellence and encourage collaboration in the State. Those programs are about the physical consolidation at the Garvan Institute at St Vincents Hospital; increased capacity at the Millennium Institute; co-ordination and collaboration in the New South Wales Centre for Agricultural Genomics area; some support for major national research facilities, such as the Australian Proteome Analysis Facility; and also, importantly, things like the Bio*First* Awards which are about bringing excellence back to the State. There is the critical mass support issue. Then there is the BioBusiness component which has a range of programs which are, in a sense, looking at the commercialisation pipeline and are basically designed to leverage off other programs or to seek fund activities, but also are primarily to increase the capacity of our scientists, our researchers who may be wishing to commercialise their products.

CHAIR: What sort of success or outcomes have you seen so far from the Bio*First* Awards from people who have come back from overseas?

Ms DOYLE: No formal evaluation of that program has been made. The calibre of the researchers that we have managed to attract back is very significant.

The Hon. MELINDA PAVEY: How many?

Ms DOYLE: We have five at the moment that were deemed as having reached the fairly high bar that is established under that program.

CHAIR: Why was biotechnology chosen as being the focus? I know that you appear before the committee in relation to BioUnit and the Cabinet Office. The committee has received a number of submissions that say that obviously wherever there is a pot of money anybody outside the pot has a significant level of interest in it being broadened. What was the reason for the focus on biotechnology?

Ms DOYLE: That is actually a question for government rather than a question for me, I believe. However, it is important to note that the Department of State and Regional Development runs a range of programs that are designed to foster innovation and commercialisation of technology. This should be seen as a targeted program within a range of other programs, not simply one thing that is occurring in government.

Mr SCHMIDT: With the appointment of Minister Sartor to the new portfolio, obviously, the scope of the organisation of the operation has been a broadened BioUnit. In that context, it is interesting to note that BioUnit operates on a model which was used first in the Office of Drug Policy so that you have a unit within the Cabinet Office which reports to the Premier but also to the relevant Minister—on this occasion Mr Sartor. It provides that opportunity of a central agency focus, but also a particular Minister whose brief is to drive science and medical research across the whole of government. So that brief has been expanded following the last election.

The Hon. PATRICIA FORSYTHE: Considering the focus of New South Wales on biotechnology, are you concerned that Victoria has more dedicated biotechnology companies than any other Australian State? Are you also concerned that Victoria claims to be the hub of national bio-medical research with the largest concentration institutes and the highest spending on medical and health regional development?

Ms DOYLE: Our focus is on New South Wales, not on the other States, except in the context that the three Premiers have now, of course, signed an Australian Biotechnology Alliance so that we are actually working in, if you like, competitive collaboration. That is our focus now and that is what is of significance, not, I guess, numbers.

Mr SCHMIDT: It is interesting to add that we are in the process of rolling out the strategy. The evaluation to be done in due course will show what impact that has had in relative terms. As Ms Doyle has also pointed out, the new alliance, hopefully, will engender a co-operative approach amongst all the Eastern Seaboard jurisdictions.

Ms DOYLE: And potentially other jurisdictions over time as well.

The Hon. MELINDA PAVEY: The BioUnit is charged with ensuring the effective implementation of the Bio*First* Strategy by measuring the performance of New South Wales in biotechnology benchmarking and against comparable economic regions. How do you conduct this benchmarking? How does New South Wales compare?

Ms DOYLE: We have not undertaken a formal benchmarking activity at the moment, deeming it too early relative to the roll-out of the strategy to be particularly informative, but there is baseline information available against which we can do our benchmarking. At the moment our focus has actually been more on outcomes at the program level and ensuring that they are successful.

The Hon. MELINDA PAVEY: One submission to our committee remarked:

> I attended the Bio Conference in Washington which attracted more than 20,000 attendees and included an address by President Bush, three Australian Premiers—Queensland, Victoria, South Australia—and the Federal Minister for Science were present. New South Wales was rather under-represented.

Who represented New South Wales at that conference? What are your thoughts on this further comment?

Ms DOYLE: I will just restrict myself to talking about who represented New South Wales. The reason that Bio exists, as well, is significant to answering that question. Bio is an industry conference and trade show: It is about industry showing its wares and what it can do. New South Wales was very strongly represented by a number of excellent companies who, we understand, have made significant connections and some real business deals as a result of their presence there. In terms of government, the Director-General of the Department of State and Regional Development and myself were there as representatives, and were very active in trying to promote the State. Our companies are very happy with the outcomes from Bio at this stage.

The Hon. MELINDA PAVEY: How many companies from New South Wales were there?

Ms DOYLE: I do not have the specific number.

The Hon. MELINDA PAVEY: Would it be 5 or 10?

Ms DOYLE: No, more than that. I do not have the number because the Department of State and Regional Development actually holds all that material, but it would not be a problem to provide it.

The Hon. PATRICIA FORSYTHE: I would like to continue this comparison of some of the other States. Queensland has a Department of Innovation, Information and Economy and Victoria has a Department of Innovation, Industry and Regional Development. Those innovation departments incorporate a science division. Should New South Wales be looking at establishing a department similar to those departments?

Mr SCHMIDT: Ultimately, that is a matter for the Government. The only observation that I will make is a general one. There is an interesting tension, when determining structures within government, as to whether you set up a discrete department by itself or whether you try to adopt the model that we have here, which is linked to a central agency level but which is able to go across all government agencies. There are ups and downs. There is a danger, if you have a discrete agency, that it can become siloed in the way it operates and it can have its focus clearly delineated between agencies that have their own turf. On the other hand, if you have a broader approach there is a possibility for the strategy to spread more evenly across all those agencies that may be doing scientific research, medical research or whatever the target area is for the Government at the time. So there are arguments for and against different structures. But, ultimately, it is a matter for the Government.

Mr IAN COHEN: Why has the commercialisation of scientific research become a major focus for governments? What are the positives? What must governments be careful of in the drive towards commercialisation?

Ms DOYLE: There are a number of philosophical approaches to that. This Government made a decision that entering and supporting the knowledge economy—of which science is a part—is one of its key focuses. What were the other elements of your question?

Mr IAN COHEN: What are the positives? What must governments be careful of in the drive towards commercialisation?

Ms DOYLE: I am not quite sure how to answer that question.

Mr SCHMIDT: In a broad sense the Government must be careful that it is not in the process of running a business or directing where research might go. The Government's job is to get an environment that fosters research and, on occasion, provides funding and other resources that might give people a boost where they might have had some deficiencies. Putting people in contact with other people working in the same field is one of the prime thrusts of the new alliance between the eastern jurisdictions. There is a tension that if government becomes too hands on it can be seen as directing research away from other areas, and that might not be appropriate. The Government is not there necessarily to pick winners. In fairly competitive circumstances it should offer grants or other assistance that might be of benefit to organisations that come up to a mark when that money is being made available.

Mr IAN COHEN: Some comparisons were made earlier in the inquiry about different cultures in some European countries, for example, in Ireland and particularly in America. Reference was made to entrepreneurial encouragement in academic institutions. What role should the New South Wales Government play in improving mechanisms that provide linkages for the private sector to universities and the government research sector?

Ms DOYLE: I can talk about the role that we play. There are two programs that are precisely about doing that. The first program, the professional development and leadership program, which is run by the Department of State and Regional Development, is about capacity building with our researchers and scientists so that they understand better and are better able to manage the landscape in which they are operating. The other is the BioLink program, which is precisely about identifying commercially valuable IP, protecting that IP and then making those linkages between the institution and the investors and, ultimately, the markets.

Mr IAN COHEN: Is it working? We were told that it takes some time to develop an idea and to actually put it into production. Is it working in New South Wales?

Ms DOYLE: Again it is too early to evaluate exactly what role the Bio*First* strategy has had in doing that. But, at the same time, we have some extremely successful companies and some small companies that have promising prospects—companies like USCOM and Unitract, which are a Proof-of-concept and B.I.F recipients. They appear to be on the edge of some fruitful international markets.

Mr IAN COHEN: You were asked earlier why biotechnology was a focus. Could biotechnology be seen in New South Wales as being at the expense of other areas of science and innovation?

Ms DOYLE: I have tried to indicate, and John has also suggested, that the Government is doing a lot of things on a lot of fronts. There are innovation and commercialisation programs. Biotechnology is a focus and it is targeted. The Government made a decision to target that partly on the strength of research activity in the State. I do not think it is a question of doing things at the expense of any other activity.

Mr SCHMIDT: The Government recently made the decision to broaden that co-ordinated area of work.

The Hon. TONY CATANZARITI: To what degree does infrastructure support prevent whole-of-government co-ordination through bidding wars between States and other facilities or research centres? Are there bidding wars?

Mr SCHMIDT: It is not appropriate for us to comment on the behaviour of other jurisdictions, including New South Wales. However, what can be said is that the alliance that was recently signed was a conscious decision by the relevant governments of Queensland, Victoria and New South Wales to do what they could to break down any barriers that may have arisen because of different approaches to supporting research in relevant jurisdictions. The mere fact of having different programs obviously can be seen as favouring one area and disadvantaging another. But the Government has recognised that there is a need for and there are benefits to be gained from working more collaboratively across jurisdictional boundaries.

Ms DOYLE: I can add to that. If you examine some of the Commonwealth funding programs it is clear that those programs have, as part of their explicit specification, collaboration between jurisdictions. Funding of those programs is predicated on that model.

CHAIR: So how can the State operate to improve leverage in achieving that Federal funding?

Ms DOYLE: That, in a sense, is a subjective question. I suppose that my job is to implement the Government's decisions on that rather than make those sorts of determinations. But I think that the eastern State model and the Commonwealth funding models around things like centres of excellence are excellent mechanisms for doing that. Early evidence suggests that the Government's approach to date, which is building critical mass and building capacity, is serving us well.

The Hon. MELINDA PAVEY: What does building critical mass mean?

Ms DOYLE: The easiest way to describe it is by stating that it is almost like having a portfolio of activity that is able to generate new activity. One researcher working in isolation on a single idea is far less likely to break through on that idea than a number of researchers working in collaboration and working across disciplines. The idea of building critical mass is pulling together people who are looking for similar outcomes but also people across disciplines who are looking for similar outcomes. So you might have researchers looking at a diagnostic or drug targeting area coming to work with bioengineers, people in photonics or areas like that. That is the theory behind critical mass.

The Hon. MELINDA PAVEY: A lot of the evidence that was presented earlier by the Australian Academy of Technological Sciences and Engineering was basically to the effect that the research and the science are there. We are looking at the commercialisation of that research and science and taking it to the next step by developing or encouraging entrepreneurs. Was that an issue in your first year with Bio*First*—bringing together finance and marrying it with the ideas?

Ms DOYLE: The Government identified that as a gap. The reason for both the incubator and the BioLink initiative is to try to put those connections in place in two quite different ways.

The Hon. MELINDA PAVEY: Can I just have an example of a connection? How have you achieved that in the past year?

Ms DOYLE: Again it is very early stages to turn around and to say to you that the thing that happened in one area equals an outcome down the track.

The Hon. MELINDA PAVEY: Is that the therapy?

Ms DOYLE: No, the heart monitor or the ultrasound.

The Hon. MELINDA PAVEY: That has been going for two or three years.

Ms DOYLE: No. Proof-of-concept grant and the B.I.F grant were actually important according to USCOM's founder. If you like, that was critical in taking it to the next step. The assistance that it received from the Department of State and Regional Development connected it with the right people and helped it to access overseas markets. That was also deemed by it to be an important factor in penetrating those markets.

The Hon. MELINDA PAVEY: Does it still have a long way to go?

Ms DOYLE: It does indeed. You will not get an outcome in the two years of the kind where I can say, "That company has made X, Y or Z progress." But it is a promising company.

The Hon. MELINDA PAVEY: I know a little about that company. I flew today with the inventor of the company who made the point to me that he is fortunate in that he is a scientist with a good personality.

Ms DOYLE: I am not sure whether the Government will come up with a program.

The Hon. MELINDA PAVEY: He is joined by a former senior executive of News Ltd who understands how the market works. So it is a unique situation. I do not know how you replicate that or how the Government can help in that process. That is why I am seeking an answer.

Ms DOYLE: To an extent the quality of the idea and the expertise of the people will always be critical factors. Government programs are not designed or able to influence those things. But when those things come together or we are building capacity for those things to come together those are things that we can influence. We are attempting to do so.

The Hon. CHRISTINE ROBERTSON: I am interested in the critical mass issue. How much work has been put into using multi-campuses for critical mass issues rather than just plonking everybody in the middle of Sydney?

Ms DOYLE: Directly through the Bio*First* program no program is designed to do that, other than I suppose helping to build capacity at Westmead. But the infrastructure grants program, which I think NSW Health is better placed to talk about, is another program that is supporting research activity. That is certainly not Sydney-centric.

The Hon. CHRISTINE ROBERTSON: Are scientists and research managers in the universities adequately familiar with the commercialisation process and the way in which industry operates?

Ms DOYLE: Again, that is very subjective and I would not presume to give a definitive answer. But I think it would be variable. We have some programs in place to try to give them access if they feel the need to build their capacity and if that happens to be a priority for their particular university.

CHAIR: Can I ask about those programs?

Ms DOYLE: There is the non-research establishment costs program, which is run by the Department of State and Regional Development. I am sure the director-general will be able to give you specific details about that. It funds a range of kinds of help for researchers who are looking to move to the commercialisation stage from assistance in developing a business plan to helping to sort governance issues and those kinds of things. Any of the early stage stuff that is not directly associated with research can come through that program. Just the process itself is a capacity building activity. BioLink is also about placing people with expertise in identifying, protecting commercially valuable IP in campuses of member institutions.

The professional development and leadership program, which is also one of the BioBusiness programs, is about directing scientists towards courses and seminars and activities where they can learn about the five key things they need to take into account. As well as that, the incubation program run by Mark Bradley at ATPI at the Australian Technology Park is specifically about nurturing those very early companies and not only providing them with low-cost facilities but actually providing them with the skills to get them through the first couple of years.

The Hon. PATRICIA FORSYTHE: In the submission you have given us a breakdown of the programs of the BioUnit and the length of time that you anticipate each of the programs to run. What we do not have is an indication of the funding for each program. Are you able to provide that to the Committee?

Ms DOYLE: It has been fluid to some extent. I mean, the $68 million is fixed but as we have identified some gaps and omissions there has been some reallocation internally towards things like the incubation program and the BioLink program.

The Hon. PATRICIA FORSYTHE: By allowing for some fluidity, are you able to provide to the Committee—

Ms DOYLE: I can have a look and see what is in the public domain that I am able to provide you with. Certainly, I will get you what I am able to.

Mr IAN COHEN: That $68 million is over what period of time?

Ms DOYLE: Five.

The Hon. CHRISTINE ROBERTSON: You outlined something about the processes that are being utilised in universities to increase the expertise. At what level do you think we need to further move forward in the universities with the commercial powers of the universities? In terms of the Bio*First* strategy, what is the level of advice to researchers with potential new products? Is there an issue with that?

Ms DOYLE: Basically, they inherit the projects and programs that I have described.

Mr SCHMIDT: State and Regional Development has a key role in New South Wales not only in scientific research but in a whole range of business activities to give entrepreneurs and other people advise about funding, promotion, marketing, linkages with people who might be able to take their ideas further. So more practical advice or information may be able to come from State and Regional Development.

The Hon. CHRISTINE ROBERTSON: So it is more their issue than your issue?

Ms DOYLE: We oversight the strategy. They are implementing the programs so they will be able to speak in more detail about those programs. Most universities have tech transfer offices and the people in those tech transfer offices have access to both State and federally funded programs which have complementary objectives.

The Hon. CHRISTINE ROBERTSON: We have met some of those people. How important is it for scientists and technologists to have the skills and the ability to move freely between industry and public sector research institutions? Do you think there is an issue that?

Ms DOYLE: Do I think there is an issue in terms of—

The Hon. CHRISTINE ROBERTSON: Do you think it is important for them to be able to do that?

Ms DOYLE: In a sense that is also a question for the scientists. I do not see any necessary barriers to that movement.

Mr IAN COHEN: We hear that in America there is a great deal more transference in the culture, and that that is part of what is holding us back in New South Wales for example. I think there is concern that there is not enough flexibility, there is not enough acknowledgement. Institutions should be moving into entrepreneurial areas. Is that a problem?

Ms DOYLE: I think you used the word "culture".

Mr IAN COHEN: Yes.

Ms DOYLE: I think anecdotally it appears that there has been a culture of industry doing its job and academia doing its job. One of the shifts that is distinctly observable is that that culture is changing across Australia and an awareness of the importance of being able to capitalise on very good research and intellectual property is something that you can observe Australia wide. The people who have provided this evidence to you would have their own views of things but I think the culture is changing.

Mr IAN COHEN: You say that the culture is changing. Should your department be driving that change?

Ms DOYLE: We can support that change.

Mr IAN COHEN: I am interested to know where a change comes from because we are hearing a complaint about a lack of drive for that connection between academia and industry and promoting the creation of solutions. I am just wondering, in terms of your strategy, who and where are you basing it on?

Ms DOYLE: It is a Government strategy rather than a Cabinet Office strategy. I believe that we are part of the drive for change but we are one of the partners in that drive for change. I have tried to outline those programs which I think are fundamental to our role in driving that kind of change. We are partners with university, industry, now with two other jurisdictions and also with the Commonwealth Government, and this is not an area where you will see outcomes unless you have

those kinds of partnerships operating. A key focus has been to work on those kinds of partnerships and those linkages.

Mr SCHMIDT: To pick up a point that Kerry made earlier, it is not government's role. It is very difficult for government to go out to institutions on the ground and say, "We think you should be directing your effort. You should be sitting down with this particular group which might take your idea further." A lot of the programs are providing advice and contacts for people—one that is raising awareness within the scientific community and, hopefully, within the business community as well, that there is a facilitation process. The Government can bring people together and help them to develop those things. Ultimately they have to make those decisions. We cannot force the marriages of the private sector and the research sector to pursue particular aims. A number of the projects or programs that Kerry has outlined are aimed to skill up people but also make resources available to people who want to pursue those ends.

The Hon. PATRICIA FORSYTHE: What role does the BioUnit have with the CRCs in New South Wales?

Ms DOYLE: Again, we do not have a direct role with any of the CRCs. The Department of State and Regional Development under the Innovation Council—again, it is capacity building and facilitation support. There is no direct Bio*First* program which links to the CRCs. In addition to that, New South Wales Health and New South Wales Agriculture are partners in a number of the CRCs.

The Hon. PATRICIA FORSYTHE: So you would not possibly be able to give me an opinion on how successful you think the CRC program has been in New South Wales?

Ms DOYLE: No.

The Hon. PATRICIA FORSYTHE: So that we understand the role and place of the BioUnit, how many people are in the BioUnit?

Ms DOYLE: There are six people at the moment.

The Hon. PATRICIA FORSYTHE: Is it possible to get some idea of the background of the officers in it?

Ms DOYLE: In the sense that we are all policy officers as well as clerical support. We have varying educational backgrounds. We have access to technical expertise as required but our background is policy.

The Hon. PATRICIA FORSYTHE: Has the BioUnit been co-ordinating the response of all the other government agencies for this inquiry?

Ms DOYLE: The role of the Cabinet office is always a co-ordinating role in that regard.

The Hon. MELINDA PAVEY: How could the New South Wales Government improve co-ordination in this area, including the commercialisation of scientific research?

Ms DOYLE: By continuing to aggressively implement the Bio*First* strategy and, I suppose, eventually see what comes out of these various reviews and considering its response to them.

The Hon. CHRISTINE ROBERTSON: Research is very competitive. That is where flamboyant researchers are able to get their heart machines, their specific pieces of technology, on the agenda. How do people approach your organisation? What is the process to get their issue on your agenda? Do they approach you, or is it done politically?

Ms DOYLE: It depends on what the issue is. If it is looking for funding, there are defined grants programs under the Bio*First* strategy and they would make an approach through that process. There are a number of advisory groups. We also attend—

The Hon. CHRISTINE ROBERTSON: Are these peers? Are the advisory groups made up of researcher peers?

Ms DOYLE: They are made up of a mix of people whose skills are research, business, investment from across the board, not just medical research but agriculture, animal health, those kinds of areas. So there are those forums. We are also fairly active and present at any of the major conferences, seminars so we are available. We have a web site where people's individual inquiries can come in. I have had personal contact with most of the key stakeholders and many of them approach me directly on issues. They also go through the normal political channels so it is quite a mix.

Mr SCHMIDT: To pick up a question that was asked much earlier, one of the benefits of having a unit such as the BioUnit within the Cabinet Office, rather than a stand alone department, is that it can act as a gateway for people and direct people. There would be very limited capacity to handle a flood of requests for assistance or advise within one organisation but that expertise is spread across government and outside government. With the BioUnit, as Kerry has pointed out, people approach us by telephone, by writing, through local members, through Ministers, at industry forums or whatever. People can be directed towards an agency or a funding initiative. The Commonwealth might be doing something which will hopefully assist them or take them on to the next step. So the unit has an information sharing and directive capacity.

The Hon. CHRISTINE ROBERTSON: Is there a specific process where another research issue could get on to your agenda?

Ms DOYLE: Through the variety of mechanisms that we have just discussed. If somebody writes to either the Premier or the Minister and makes representations on a specific issue we would be part of the process of advising government on that.

The Hon. MELINDA PAVEY: The $10.9 million over four years for the process of forums on spinal cord injuries and conditions, is that in addition to the $68 million?

Ms DOYLE: That is correct.

The Hon. MELINDA PAVEY: Could you by way of background tell me how the Government came to want to put the $10.9 million specifically into spinal cord research? Is it because we have some leaders in the field and it was deemed to be a good way to move on from that?

Mr SCHMIDT: I do not think it is appropriate for us to comment as to why a particular program was chosen but, as you will be aware from the forum itself, it was an issue of particular concern and interest to the Premier. In the context of organising the forum and as a result of deliberations with Cabinet, an amount of money was determined to pursue the outcomes of the forum into the future. It was chosen by the Government itself.

The Hon. MELINDA PAVEY: Have you been able to establish whether we have some leading researchers in the field?

Ms DOYLE: We have some highly skilled neuroscientists in New South Wales, yes. I would hope through this program that we will increase that and increase their capacity.

The Hon. MELINDA PAVEY: Has funding been allocated so far from that $10.9 million?

Ms DOYLE: Do you mean have any of the grants been given out—no, not at this stage. Funding commenced in this financial year. The core grants should occur within the next couple of months, with funding to be allocated in 2004.

(The witnesses withdrew)

(Short adjournment)

DARRYL JOHN O'CONNOR, Secretary, Federation of Australian Scientific and Technological Societies,

CHRISTOPHER JOSEPH DALZELL FELL, President, Federation of Australian Scientific and Technological Societies, and

THOMAS HUMPHREY GASCOIGNE, Executive Director, Federation of Australian Scientific and Technological Societies, affirmed and examined:

CHAIR: To each of the witnesses, if you consider at any stage during your evidence that certain evidence or documents you may wish to present should be heard or seen in private by the Committee, the Committee will consider your request. However, the Committee or the Legislative Council itself may subsequently publish the evidence if they decide it is in the public interest to do so.

Before opening questions, I invite you to make an opening statement.

Professor FELL: We would each like to speak briefly, if we may.

CHAIR: Certainly.

Professor FELL: The Federation of Australian Scientific and Technological Societies [FASTS] is a society representing the various scientific societies in Australia. In turn, they have 60,000 members. A fair number would be in the State of New South Wales. They are practising scientists, so we are offering our comments from that viewpoint. We would simply say, firstly, that a lot of good research is done in the State of New South Wales in public sector institutions—the universities and also others. We do not believe the State of New South Wales is as proactive as the other States in providing support for research. We would particularly say Queensland, Victoria and South Australia are more active, and that shows in the dollars provided. Although there have been a number of useful developments—the ATP, Bio*First* and AC-cubed—in our view these are probably fewer than should be.

We are very concerned, generally, about the commercialisation of public sector research throughout Australia and particularly in the State of New South Wales. It is relatively poorly handled by international standards. Universities tend to have either specialist arms doing this or handle it through a business office. The ability to secure and get full value from intellectual property [IP] is not as good as it should be, in part because of the makeup of the companies or alternatively the experience of people doing it. Researchers are quite keen to get funds to continue their work but do not consider the long-term implications of leakage of IP. We would see benefit in there being a State body that looks after commercialisation, to give the critical mass. The current university companies are looking upon a watershed that is too small to be really effective. Generally speaking, one invention for $10 million of research expenditure would be the international norm. That is an approximate figure. One can then do sums on the likely number of developments, and indeed the number of these that yield financially beneficial outcomes. There have been some. I cite Memtech in this State as a good example that has been highly beneficial to the State. I think I will stop at this stage and hand over to my colleague Dr O'Connor.

Dr O'CONNOR: Unfortunately, due to my computer having a disk crash just prior to making the submission, a significant section was left out of our submission that I would like to draw attention to. In a longer-term view about commercialisation and the health of science in this State, one of the crucial issues is what is happening in education, and particularly in secondary schools. We would like to point to the continuing problems with the enabling sciences in New South Wales, enabling sciences incorporating physics, chemistry and mathematics. That is something that is not unique to New South Wales but in the longer term it is not just the issue of producing more scienctists to assist in commercialisation, it is an issue about raising the general awareness of what sciences are about and can deliver, and having that science awareness in the minds of lawyers, businessmen and other people in the community. It gives an opportunity to improve the awareness of what science can do and how science does it and also improve the uptake of new ideas and technology.

Mr GASCOIGNE: I would like to make two points. The first is building on the point that Dr O'Connor made, but I think there is a growing gap in our society between people who understand and

can apply science and the rest of the population. As an example of this—it might sound like a trivial example, but if you flip open the pages of *NewIdea* or *Women's Weekly* these days you will see a page on palmistry, a page on horoscopes, a page on reading tealeaves and a page on tarot cards, but there is not much science there. It is a bit of a worry at a time when our society is getting more and more sophisticated and depending more and more on science and proper understanding of nature and natural processes and the way these can be applied to the benefit of the country. There seems to be a growing number of people who are relying on superstition and faith as a way of getting out of problems. That really builds on the point that John was making about the need for education so that people have some sort of fundamental understanding.

The second point I would like to make is quite a different one. That is that I do not think anyone has bothered to ask the scientists why they are commercialising their work. That was until we did an extensive survey about five years ago when we ran 13 focus groups across the country from Perth to Townsville, including three focus groups in Sydney. Essentially, we assembled a group about as big as this of scientists from diverse groups. We sat them round a table for an hour and a half and we posed the question, why aren't you commercialising your work? They told us. Interestingly it was not as though there was a mountain between them and commercialisation; it was like bumpy foothills. As they got over each hurdle another was looming. First, they had to sort out what to do about IP and then they might have to sort out the venture capital. Then they might have to work out an arrangement with their employer, if they worked for a public sector research agency.

One of the conclusions we came to in that report, which is published and a copy of which we did send to the Committee when we made a submission, was that commercialisation of science at that stage seemed to be at a fairly immature stage in Australia and does require a certain sophistication, not only on the part of the scientific community but also industry, Government and the general public. So, there was a sort of cultural thing where you needed to push forward on these four fronts. At present we are looking at doing a follow-up study to that, a tracking study—has anything changed in the past five years? We are currently discussing that with the Federal Department of Industry, Tourism and Resources; and it may be possible to do a New South Wales-centric version of that if you wish to find out an accurate picture of what scientists living in New South Wales think about that.

CHAIR: I following on from the points Dr O'Connor raised regarding education, and he mentioned school education, a theme we have already heard today. Ongoing adult education, in documentaries and scientific discussions—*New Idea* was given as an example, but a lot of the scientific documentaries that previously would have been seen such as *Quantum*, and things like that, are not available anymore. Do you see that as having a bearing as well, or do you see the focus being very much on school education?

Dr O'CONNOR: I see them both as important. The ongoing is crucial, but it also needs a framework to build properly. It is like planting seeds. Some seeds will grow almost anywhere but they will grow best on fertile ground. So, if there is a proper foundation at high school, even going back to primary school, as long as there is a proper foundation to understand how science works, the ideas that are presented on shows like *Quantum* will really be better taken rather than just becoming a snapshot that people enjoy and then forget. So, I think there is an essential component there which has to do with infrastructure.

CHAIR: In your submission you state that New South Wales has not supported science and technology research and innovation to the degree that other States have. How has this occurred and, in your opinion, how can this be best addressed?

Professor FELL: Certainly the States that have been the strongest supporters, Queensland and Victoria, have distinct groups that look quite deeply at scientific development within the State. FASTS did write to the Premier prior to the last election pointing out that this would be desirable. Indeed, we were delighted that Mr Sartor has science in his ministerial title. We would hope that that appointment would lead to a much greater emphasis on talking with the people who are working in scientific technology areas, looking at how that can be linked to State development. I would simply offer the comment that Mr Kennett chaired a group that looked at the technological development of Victoria and that has been carried on through to Mr Bracks' Government, and I believe something very similar happens in Queensland. In my role with FASTS I have talked extensively with the equivalent of State development departments in both of those States. This is not the case in this State.

Dr O'CONNOR: As a practising scientist and an active researcher I was part of a bid for a centre of excellence in the last round for ARC. That involved researchers from Victoria, the ACT, New South Wales and Queensland. In each case we were asked to seek support outside our own institutions. The mere fact that there was someone from Victoria meant that that application already had $1 million up front offered. In the case of Queensland there was a significant contribution. In the case of New South Wales there was a series of emails that came just prior talking about a small amount but making no commitment. In the end that was not even included in our application because it was seen to be detracting from the application rather than supporting it. So the other States gave a very strong lead in terms of offering support, and I believe that is also reflected in where those applications were successful, in which States the principal centres of excellence were supported.

The Hon. CHRISTINE ROBERTSON: Who were you dealing with at the State Government level?

Dr O'CONNOR: We received an email from, I think, the Premier's Office. I cannot tell you the name. I would have to go back and check through my emails, but I think it was someone who sent out an email in the first instance to all the research officers at the universities, which were then passed on to the people who were filling out the applications. But I cannot tell you off the top of my head who it was.

The Hon. MELINDA PAVEY: And the million-dollar commitment from Queensland and Victoria came from the Government?

Dr O'CONNOR: Yes. There was $1 million from Victoria and about $100,000 from Queensland. They were just part of this consortium.

Professor FELL: This is not scientists begging for more money; it is a suggestion that the State should be investing in it because it leads to beneficial outcomes.

Mr GASCOIGNE: We have a chief scientist nationally, Robin Batterham, and he plays a major role in being a focus of attention for science, being a conduit between the scientific community and government. He performs a very useful role in just assembling knowledge and being a place to pass issues through. Queensland has a chief scientist, Dr Joe Baker, who is also the ACT Commissioner for the Environment. He does that on a part-time basis. Victoria has engaged a firm of four people as chief scientist. That group is headed by John Stocker, who was CEO of CSIRO before Malcolm McIntosh. Gus Nossal, who was president of the Academy of Science, is another member of that team. That firm is called Foursight and it is engaged as the chief scientist of Victoria. New South Wales might consider having a chief scientist to act in this conduit role between the scientific community and the government itself.

CHAIR: We have heard evidence elsewhere about the different stages from research through to full commercialisation and the fact that venture capital is not available until a fair way toward the end of the process. Do the different States get involved at an earlier stage than New South Wales? Is that part of the difference?

Professor FELL: To my knowledge other States have not got formal mechanisms to actually provide funding. They tend to encourage critical masses of researchers to be developed and then rely on the normal mechanisms to fund those critical masses. Frequently, it is by providing a measure of continuity in funding for research that enables groups to stay together and do things. There is a clear lack of funding at the bottom end of the research chain. I would suggest that there is adequate venture capital around at the mezzanine level when something has gone through the proof of concept stage. It is really taking it from the bench level up to the early stage of proof that it will progress.

The Hon. PATRICIA FORSYTHE: Dr O'Connor, you referred earlier to an application. Victoria had $1 million and Queensland had $100,000. What was the outcome of the bid?

Dr O'CONNOR: It was unsuccessful. I should say that the competition was quite high. But it may be a reflection of that input. But certainly there was an excellent application. It got to the second round.

The Hon. TONY CATANZARITI: Is the public money expended on commercialisation in New South Wales having the appropriate impact? If not, why not?

Professor FELL: There are a number of different ways it is expended. It is normally expended within universities to support wholly owned companies or business offices. By and large, it is usefully spent but perhaps not as effectively spent as it might be, though I have not answered your question, I am afraid.

CHAIR: Where does New South Wales spend public money on commercialisation? From the scientific perspective, where do you see it?

Professor FELL: I can speak from experience of Unisearch at the University of New South Wales, where $10 million was set aside to assist Unisearch in funding early-stage research development. I suspect similar sorts of money is spent at the other larger universities. It probably does not appear on the balance sheets of the universities as such. In a way, that is why we feel it might be better to have a State-focused arm to do some of this work so that the risk that is associated with this is clearly visible to everybody. And there is risk. There is great reward but there is considerable risk.

Dr GASCOIGNE: I am not sure whether it applies to New South Wales but in some States the co-operative research centre program is supported. They are partnerships between research organisations and industry. Commonly they will have a dozen or so partners involved. The idea is that the people that are going to use and apply the research, that is, industry of one sort or another, get together with research organisations which can actually conduct the research and together they plan what needs to be done. The idea behind it is that because the industry side is involved in planning the research the chance of the uptake is much greater. The CRC scheme is worth about $150 million a year. It is a federally funded scheme but in some States they provide money to support organisations wishing to make applications for co-operative research centres. I am not sure whether that is the case in New South Wales.

CHAIR: Have you or any of your members had contact with the Bio*First* program in New South Wales?

Mr GASCOIGNE: No, but we tend to speak for science as a whole and represent science as a whole rather than getting involved in specific disciplines.

CHAIR: That is just as helpful an answer.

Professor FELL: I am personally aware of colleague scientists having been involved in that activity but I could only comment second hand.

The Hon. MELINDA PAVEY: FAST's submission primarily concentrates on university research. Have you analysed the efforts of the public sector in general?

Professor FELL: No.

The Hon. MELINDA PAVEY: In your submission you come straight to the point that we all need to deal with, at point No. 6: the establishment of one entity to handle commercialisation of all university research in New South Wales. Are other States doing it better than New South Wales?

Professor FELL: The heart of most of the pre-seed funds that have been established recently—are essentially Melbourne-based operations. I know that there is a deal of activity in Queensland through Uniseed to also provide a substantial pool of early-stage development funding. So I would say that other States are doing it better. I know that the Government has involved itself in encouraging those developments. The model that we had in mind when we talked about State operation would be something like the British Technology Group [BTG]. Its strength is that it has a large enough catchment to make economies of scale operate. If each university or bureau of agriculture has to run its own IP protection system the number of officers required is too large to cover effectively the range of different disciplines. When you do it on a State-scale it starts to make a lot more sense.

CHAIR: What sort of outcomes has the British Technology Group had with commercialisation?

Professor FELL: It offers to commercialise any research in British universities. It is not compulsory—it was at one stage. It can tap into substantial venture capital funding. Its strength is that it has very high level skills in analysing opportunities. Once a particular project has a stamp from BTG it is almost certainly assured of funding. That is the weakness here. Venture capitalists are not terribly happy to invest because they essentially do not trust the level of competence of the small operations, the business offices or the Unisearches to do a dispassionate analysis of the opportunities associated with research.

CHAIR: What is the role of government with the British Technology Group?

Professor FELL: It is a part shareholder in the operation. I do not have the exact figure.

The Hon. MELINDA PAVEY: Do you see that as a model that could be applied at a national or State level?

Professor FELL: I think because the geographic spread of Australia it is probably better to do it at a State level. My estimate is that the catchment is big enough to make it work at the State level. If you do a calculation based on the number of likely innovations coming out of research there is enough research activity in this State—I was estimated to be about $300 million a year—for that to generate a flow of "deals" as they use the word, that would make it worthwhile to have something at the State level. The other point is that you can then start to attract top-level people to actually run it or sit on the board so that the skills for analysing opportunities are there.

Mrs PERRY: Would you have entrepreneurs at that level?

Professor FELL: I certainly would.

The Hon. MELINDA PAVEY: But you would have scientists and researchers still at the university level.

Professor FELL: From personal experience, the trick is one of passing the baton on to the entrepreneurs, not necessarily having the scientists trying to do everything.

The Hon. MELINDA PAVEY: It is not rocket science.

Mr GASCOIGNE: One of the things that came out of the commercialisation study is almost universal criticism of the university of technology transfer arms. People complained that there was not enough expertise within those arms. People seemed concerned about keeping vice chancellors out of trouble. I remember one scientist saying quite openly that he had what he thought was commercial idea. He went to his university of technology transfer group and got involved in an arm wrestle for nine months about IP issues. In the end he said to heck with it and went back to writing scientific papers because that was the basis on which he was promoted within his organisation.

I will move on to another possible model. An American-based group was running the University of Pittsburgh Gateway. Information is available on the web at the Pittsburgh Gateway system site. A Melbourne-based group called Ai Squared has been a promoter. A small group of four or five people working in Pittsburgh, which is a fairly unpromising area in the United States in this regard, trawled through the universities within the area to make contact with any scientists with ideas worth commercialising. They screened them in a month and picked out the top 20 per cent or so. They put individual scientists in contact with a mentor—someone who had been there and done that—and they worked together for three months and drew up a business plan for the idea. At the end of the three months the Gateway group looked at the progress made and picked out the top 25 per cent, which brought the number down to a single digit—8 per cent or so. In the course of about three or four years, the group got about 20 commercial entities up and running, the largest of which had a turnover of about $US28 million. Having been through that experience, it offered practical and realistic assistance to the scientists. As they move through commercialisation process they need

assistance with different aspects. It offered assistance at the very human level of changing needs and requirements. That might be a second model.

Mr IAN COHEN: We have heard that American universities have a different culture with regard to commercialisation of scientific research. Is what you have described part of the American culture; that is, that they can cross over between the academic institutions and permission to commercialise?

Professor FELL: It is a very different culture because ownership of IP very different in the United States. If they get Federal US Government funding that IP can be used without payment by any American company. Here that is not the case, and some have argued that it should be. However, that confounds the situation. Of course, our risk is that overseas corporations can come in and strip us. That does not happen in the United States. I have a salutary comment, if I might make it. Last night I was talking with a senior patent person who made the comment that he was seriously worried about the future scenario in Australia. He quoted another State and said that a bunch of white-shoe people are now moving in on the universities and getting IP at quite low cost because of inept dealing with commercial arms sponsoring further research by research groups—the researchers are very happy to have the money to continue their work—and then floating companies, from which they then take a healthy profit. After a couple of years, the company may or may not be successful.

This morning's *Sydney Morning Herald* carried an article about ducks quacking and the large number of IPOs in the marketplace at the moment. This is a very real scenario. The real risk to the economy is that people are not checking carefully whether the IP is properly developed and when the public invests in the IP that it is looked over carefully by experts. Our comment as scientists is that we must have those people as well as white-shoe businesspeople making those decisions.

Mr IAN COHEN: Your submission cautions the New South Wales Government not to anticipate that licensing income from the sale of intellectual property development in the State's universities will become a significant proportion of university income. Is there no way other than going through commercial or private interests at that point?

Professor FELL: Even among the universities that have the most highly developed schemes for commercialisation—for instance, Stanford University—rarely does the income climb above 5 per cent. However, it changes the whole industrial or commercial strength of the community or the State, and that is where the benefits flow.

Mr IAN COHEN: Therefore, the New South Wales Government could improve coordination between government departments and in the commercialisation of scientific research.

Professor FELL: I believe it could. The Commonwealth Government has $70 million of pre-seed funding. It has also supported industry investment funds and pool development funds, both of which put a fair bit of money on the table. They have attractive tax treatments on capital gains, so people are encouraged to invest in them. Money must be spent on research and development to support commercialisation development activities. I believe greater State Government support could assist research and development in New South Wales to tap into some of those funds. That is what is happening in other States.

Mr IAN COHEN: You mentioned Memtech.

Professor FELL: Yes.

Mr IAN COHEN: It is an issue of interest to me as a Greens member. It has been a success story that fits in with the Australian needs and culture in terms of water filtration systems and so on. Are you aware of any other areas which are typically Australian and in which we are natural leaders that we can capitalise on?

Professor FELL: We are actually very good at IT, and particularly software development. We have had some market successes in that area. I can think of others, including opportunities in biotechnology because of our rural strengths. The State missed the boat in coal. The Queensland Government recently announced the Coal 21 initiative with the Australian Coal Association. Although

New South Wales is a major coal export State, the Queenslanders have that one going. That is another one. We are quite good in the medical area, but not as good as Victoria. However, I would expect some benefits to flow from the new accent on cancer treatment, provided the medical institutes can successfully capture any IP. There are problems between how IP is handled in the health system and how it is handled in the universities. We have joint appointments and it is really messy. That is another issue that must be sorted out at a government level.

Mr IAN COHEN: You mentioned the lack of funding at the bottom end and then the mezzanine that comes in. Is it primarily a government responsibility to solve that problem?

Professor FELL: I believe it is. Average citizens—such as the people in this room—would not feel happy about their superannuation funds investing in some of these activities unless they were sufficiently well regulated to give a chance of success. It is like backing a horse in the Melbourne Cup—we would like to think that the race is fair. Scientists will obviously be very enthusiastic about their work--they would not be in the game if they were not. However, we need a system that carefully assesses the situation to see whether it is worth investing in. Only one in 10 will pass the gate of being commercially successful.

The Hon. PATRICIA FORSYTHE: What is your view of the cooperative research centre program in New South Wales?

Professor FELL: It has been extremely valuable, but perhaps less so for innovation in the big sense and more so for bringing about constructive incremental development in various industries.

The Hon. PATRICIA FORSYTHE: Does New South Wales have sufficient and adequate facilities to ensure the long-term success of the CRC programs and continued investment?

Professor FELL: I believe that New South Wales does not invest enough; other States are moving faster in that direction.

Dr GASCOIGNE: We wrote to the Premier on 6 February citing the results of the recent CRC round as an example of the State's low level of performance—10 of the CRCs are to be headquartered in Queensland, six in Victoria and only four in New South Wales.

CHAIR: We have had some information on the latest round, including what you have said. Is that typical of what has happened? The program has been going for the past 12 years. Is what has happened in the last round an aberration or has it been ever thus?

Professor FELL: There has been a gradual leakage of headquarters from New South Wales.

The Hon. PATRICIA FORSYTHE: You mentioned IP and being treated differently by universities and health. Where do you see the responsibility lying in addressing that issue? Does the Government need to be involved? Is it a problem at the university level? What do we do about addressing that issue?

Professor FELL: It is up to the Government to give leadership to both sides to come up with sensible compromises that will work at the State level. These are all State instrumentalities, both the universities and the health system.

The Hon. CHRISTINE ROBERTSON: This has been mentioned in relation specifically to health and the problems New South Wales University and Sydney University have with the joint programs. The issue is the information policies of government departments and universities, not the mismatch.

Professor FELL: Yes.

The Hon. CHRISTINE ROBERTSON: There is a great difficulty with ownership and the funding bodies.

Professor FELL: Yes.

The Hon. PATRICIA FORSYTHE: You spoke earlier about the white shoe brigade potentially getting involved in some of the Unisearch-type activities. Is that because of the outcomes that universities have for their research arms? Are they looking for short-term outcomes that have a profit margin attached, rather than necessarily focussing on the research?

Professor FELL: I do not believe so. Once a critical mass of researchers has been established, they are essentially quite expensive to maintain. So, if you are talking about large programs, as a research leader you wish to keep the research going—perhaps in advance of its commercialised potential. But nonetheless it has commercial potential. I have not given you a clear answer to the question, but I do not believe so. It was said to me, "It beats this business of prospecting for minerals. You don't have to go out with dirty geologists to the backblocks; you can just go downtown and talk to a few scientists."

Dr O'CONNOR: If I could add to this, because in the past I have been approached by what one might call the white shoe brigade. Effectively, they make very attractive offers. If this is an easier way of getting funds to continue research, then if you go to ARC your success rate is 25 per cent, and even though your application might be top-ranking you might just miss out. In fact, I have been on the ARC panel, and more than 50 per cent of applications are well and truly fundable, but many very good applications miss out. If you can get an almost guaranteed source of funding, it becomes very tempting to do so. However, the issue here is that the persons putting up the money are seeking the credibility of the university for their own means. So it is a matter of personal ethics whether you accept this source of funding or not.

Professor FELL: John said it very much better than I did.

The Hon. CHRISTINE ROBERTSON: You spoke about the Queensland and Victorian departments of innovation, information and economy and the innovation industry and regional development, but it is the science division in which I am most interested. How would you set criteria for selection to the science division, and what sort of processes would be used for that to occur in New South Wales? Perhaps I should not say this, but I feel Bio*First* has excluded a lot of scientific endeavour in other areas in New South Wales. For the future, this science division should, surely, be more representative of the scientific world. How would that happen? I understand the competitive nature of science, but have you any ideas how that would best happen?

Mr GASCOIGNE: What do you mean by "the science division"? Are you talking about a science council of this State, or what would be the nature of it?

The Hon. CHRISTINE ROBERTSON: It does not matter what it is called. You spoke earlier about Queensland and Victoria having a specific group of people which included a chief scientist. I am talking about that sort of process.

Mr GASCOIGNE: The Prime Minister's Science Council might provide an interesting model. The Prime Minister has a Science Council, which has been increasingly influential in national policy-making. Chris can speak on this authoritatively as a member; I can speak on it as an observer. On that group—which meets formally twice a year and has two one-day meetings—from the parliamentary side are the Prime Minister and nine of his Cabinet colleagues, including the Minister for Science, who is not in Cabinet, while on the non-parliamentary side are representatives of about a dozen major organisations, including the Academy of Science, the Vice-Chancellors Committee, the Australian Academy of Technological Science and Engineering and FASTS, as well as some business organisations. The third component is a group of about four scientists who are hand-picked for their individual contributions. That group does a number of things. I mentioned they have formal one-day meetings, but they also have working parties building up an agenda to those events. When Peter Cullen was President of FASTS, he served on that committee. That was at the time of when the salinity strategy, which was the first paper presented to the Prime Minister's Science Council and eventually found its way through to policy.

The Hon. MELINDA PAVEY: Professor Fell, pretend I am the Minister for Science, and I was to give you $68 million over five years to develop a commercial arm with universities in New South Wales and with all other research operators within New South Wales. If you were the head of

that and you could engage the best entrepreneurs you knew were unavailable, what do you think you could achieve in five years?

Professor FELL: I suspect I could attract 50 per cent of the total mezzanine funding that is available in Australia for development of commercialisation. That is a start. That means bringing probably a couple of hundred million dollars into the State economy to support research. As an outcome of that, I think I could have a reasonable go at having a number of Mentecs. Would that be a reasonable start?

The Hon. MELINDA PAVEY: Let us hope it becomes a reality.

Professor FELL: Bear in mind Mentecs was either good or bad. In the end, it was bought by the Americans for A$600 million. That was, in my judgement, a good outcome. Even though the technology was lost to Australia, we are still making stuff here. So that is the good step forward.

The Hon. CHRISTINE ROBERTSON: What sort of process do you think we would use to attract the right people to join such an advisory board? Let us call it an advisory board.

Professor FELL: You have to talk with the people who are leading these activities already in the State, but I would be seeking national advice as well.

The Hon. CHRISTINE ROBERTSON: We discussed in the last session the issue of short-term commitments: the political cycle is short term and the business cycle tends to be short term for profit, while much scientific work is very long term. The issue is when you are in government and you need short-term results, how do you advise policy so that long-term outcomes can be considered at the same time? Have you any suggestions?

Mr GASCOIGNE: It really requires a change of culture. The retiring President of the Business Council of Australia commented earlier this year that the average lifespan of a chief executive officer of companies that are members of the Business Council is about four years, which is about the same as the parliamentary cycle in Australia, with share options making up a major part of the remuneration of a business executive. Clearly, then, the impetus on them is to maximise the bottom line, and if you have scientific research cycles of 10 and 15 years—if you are talking pharmaceuticals and things like that—it requires a change of attitude of people looking at venture capital and having a patient, long-term view of things.

CHAIR: You referred before to both the Gateway example and the British Technology group. I think you spoke about two key matters as being currently missing. The first was regulation through some form of accreditation, and the second was the central provider of advice and information on IP. Are those, as you see them, the two critical gaps at present?

Professor FELL: I believe they are. I think at government level you need to talk to the people who are familiar with these areas and figure out how the government can assist the industry to provide some measure of confidence for investors—much as it has in the finance arena, which is something that Australia, and indeed this State, is extremely good at. We have not achieved the same skill set in commercialisation of IP.

CHAIR: And, as a consequence, currently is it fair to say—without naming companies—that some of the science which would have ended up being commercialised may easily be significantly less meritorious than that which simply never gets venture capital because the fund managers have no benchmarks?

Professor FELL: I believe so. It is also a measure of the competence of the people making the judgements.

Mr GASCOIGNE: There was quite an interesting case study of Keith Williams of Proteome Systems Discovery. He was a professor of biology at Macquarie University until about five years ago, and has now set up a company in the Macquarie University precincts, just outside the university in North Sydney. He has a company of about 110 people, including 40 PhDs, and does business on an international scale with people like IBM. He spoke at an event that we organised at the National Press

Club last year, and gave a simple account of how he changed from being a humble professor of biology, I think was the term used, into a captain of industry. It was an interesting case study in the sorts of cultural things you have to do to get over this gap. Certainly, some of the settings in Australia did not assist him. If I could give an example of that. Even things like superannuation and leave provisions can be significant handicaps for people who want to change course, temporarily or permanently, from being in a publicly funded research organisation. If you want to be commercial, you might have to go off line and pursue your commercial process for a couple of years to get a company up and running before you then go back to being a scientist. It is a pretty challenging sort of career path to go through in Australia, given the current provisions relating to things like superannuation and conditions of employment.

The Hon. PATRICIA FORSYTHE: Last year one of the newspapers was running a fairly strong campaign about whether research was compromised by academics apparently having links to industry. In the context of what we are looking at, that is quite significant, but at the time I thought the strength of their campaign was somewhat unusual. Are the cultural issues another factor that underpins the whole issue of universities and research?

Mr GASCOIGNE: I can give a very simple answer, but both my colleagues would know more about it than I. The simple answer once again would come from the views in this paper. Within some research organisations work done at a commercial level was regarded as being compromising and was regarded as second-rate work. So there was still—this was five years ago—within those organisations a residual feeling exactly as you described.

Professor FELL: I guess my question is: Why do the research? If it is simply curiosity-driven, it is a pretty longbow to convince the person in the street that it is worthwhile doing. I would defend to the end the need to do basic research, but you should always be thinking that it has some end game in sight—thought it might not pay off for 20 years. But, if it is purely for the curiosity of the scientists or researcher, that is quite a dangerous situation. It is up to the ethics of the scientific community to make sure that commercialisation does not pervert the science—and I am not saying the scientific community is any more ethical, though it probably should be, than any other group in society. But, clearly, that is important. Yes, the papers pick up examples where people have erred—and properly so.

The Hon. CHRISTINE ROBERTSON: I have some concerns with the aims of this inquiry if, regarding all research done by the public sector—including State government departments—some sort of decision is made that it has to have a commercial arm. What happens to the politically unpopular that actually informs policy? I know that in a way this is already a problem because of the competition considerations.

Professor FELL: You must regard the commercial arm as a method of actually catching the fish that are useful for the economic development of the State. It should not go back down and stop certain types of work being done.

Dr O'CONNOR: If I could come in on this one, obviously, a lot of research is not going to lead to a product but ultimately does, so if you target only that research that appears to lead to a product you will lose out on some potentially very valuable lines of research. The focus should not be on making the commercial arm the decision body about where that research should lead. You need to have a broad spread of research, including things that will not necessarily suggest a product in five or 10 years because it will be from those areas that you probably will get a product in five or 10 years, and the areas that are very highly focused you may find wither and die because they are gazumped by different technology elsewhere. It is very important to have a breadth that is not governed by some short-term imperative.

Mr GASCOIGNE: It was quite a useful definition that John Stocker and Don Mercer gave when they reviewed the CRC program some years ago. They talked about the definition of commercialisation including staff that normally would not have a direct dollar attached to it. It was almost as though you used "commercialisable " as a synonym for "usable". They talked about environmental research and they also talked about agricultural research, which quite commonly is given away. In relation to an earlier question from the Hon. Patricia Forsythe about whether the New

South Wales organisations do commercialisable work, how do you put a dollar figure on the advice offered by New South Wales Agriculture and the department for the Environment?

The Hon. CHRISTINE ROBERTSON: Or even population health?

Mr GASCOIGNE: Exactly.

The Hon. MELINDA PAVEY: To help with my understanding of related issues, what is your relationship with the Australian Academy of Technological Sciences and Engineering? Do you get together at all?

Professor FELL: Frequently, and also with the Academy of Science, and the Academy of Humanities and Social Sciences these days as well. We are a peak body. We are in that milieu of working together.

Mr GASCOIGNE: With both of those academies, for instance, as partners we run an event called Science Meets Parliament Day, which brings a whole lot of working scientists into Canberra for a two-day event. We have a day of plotting, planning, strategy, tactics and ideas at the National Press Club and the following day we have a series of one-on-one meetings in Parliament House. It is a good way for working members of Parliament to come into contact with working scientists. I'm not quite sure what the situation is in the New South Wales Parliament, but I suspect it like the Commonwealth Parliament. If you look on the Commonwealth Parliament web site, 5 out of 226 members said they were scientists in their past lives, it is about 2 per cent. The reason I mention this is that both the Academy of Science and the Academy of Technological Science, and other groups like the Institution of Engineers and the Vice-Chancellors Committee are partners in that enterprise.

The Hon. CHRISTINE ROBERTSON: Would you mind sharing one of those agendas with his Committee?

Dr O'CONNOR: It would be remiss of me if I did not say that Professor Fell and I, as New South Welshman, are quite keen to have a State Government version of this.

The Hon. CHRISTINE ROBERTSON: So you will share an agenda without?

Dr O'CONNOR: Yes, certainly. The State Government could benefit greatly from having this interaction with scientists. It is not the case of scientists lobbying members of Parliament, it is about sharing knowledge and ideas. It is a useful two-way flow of information.

Mr GASCOIGNE: I do not wish to hammer the Queensland thing, but Queensland has just had its second session. I have an evaluation report from Queensland, which I could show you. We have evaluation reports and there is information about our event on our web site, as we speak. It is coming up again on 14 and 15 October. If anyone would like to attend as observers, they would be most welcome to come along.

CHAIR: I am pleased to hear with the agenda you have described that all the plotting is done at the Press Gallery and not the Parliament. I thank you very much for the material you have sent to us, the time you have given us today and, obviously, the work you do every day. It is much appreciated

(The witnesses withdrew.)

(Luncheon adjournment)

LOFTUS WRIGHT HARRIS, Director General, Department of State and Regional Development, 1 Farrer Place, Sydney, and

MICHAEL WILLIAM O'SULLIVAN, Executive Director, Industry, Department of State and Regional Development, Level 43 Grosvenor Place, 225 George Street, Sydney, sworn and examined:

CHAIR: Welcome, Mr Harris and Mr O'Sullivan. If you should consider at any stage during your evidence that certain evidence or documents you may wish to present should be heard or seen in private by the Committee, the Committee will consider your request. However, the Committee or the Legislative Council may subsequently publish the evidence if they decide it is in the public interest to do so. Thank you for joining us today. Do you wish to make an opening statement?

Mr HARRIS: I might do so in order to assist the proceedings. The Department of State and Regional Development is essentially a business development agency so most of the views that I expect to bring to the Committee are the sort that one would expect of an organisation that is largely interested in the commercialisation aspect of your inquiry. We take a keen interest in the earlier stages in terms of science research and development but our particular areas of interest are commercialisation and how to help companies grow to develop a sustainable business. Indeed, in the area of innovation it provides an opportunity to be leading edge, which, dare I suggest, is an incredibly important factor in a country the size of Australia.

We have chosen to bring with us today a brief presentation that we have used only recently—with some success—at AusBiotech in Adelaide and also on a recent visit by the Innovation Council to Southern Cross University. The purpose of it is to give an outline to an audience of the continuum of opportunities that exist in working with the department to take a product all the way from research through to commercialisation. I thought that as a matter of edification it might be of interest to the Committee. We are happy either to give it to you in written form—it is a selection of PowerPoint slides—or for Mr O'Sullivan to deliver it. I do not know whether it is of any interest to the Committee.

CHAIR: Could you please table that document?

Mr HARRIS: Certainly.

Document tabled.

Mr HARRIS: This was a relatively last-minute thought but it has proved to be fairly useful so we thought that we would bring it along and offer that option to be Committee.

CHAIR: As a guide, about how long is the presentation?

Mr O'SULLIVAN: It will take about five minutes.

CHAIR: Please proceed.

Mr O'SULLIVAN: As you will note from the front page, Hamish Hawthorn is one of the officers in our bio unit. We gave this presentation at the AusBiotech conference in Adelaide at the beginning of the month and Hamish adapted it to take on the issues associated with Southern Cross University. As you will be aware, we administer the BioBusiness component of the $68 million Bio*First* Strategy. The BioBusiness element is worth $16 million. We do not see ourselves as working alone. We are helping companies to grow so that they have their own capabilities and their own interest in making their research work on a commercial basis. We have a close association with the number of major organisations. AusBiotech is the national industry association. The Australian Innovation Xchange comprises both government and private sector groups led by the Australian Industry Group. Similarly, the Australian Institute of Commercialisation has both private and public sector partners. The AustralianBiotechAlliance is the recent announcement by the Premier's to work co-operatively on biotechnology. In terms of the international promotion of biotechnology, Austrade and other government agencies work on the Biotechnology Events National Committee.

We start from the basis that a person working at one of our universities, or perhaps even a Major National Research Facility—Australian Research Council Centres of Excellence—has a new idea. In this case, it is a device that increases the speed of cell-selection, which would make a tenfold improvement in the system. He might attend one of our seminars, such as the regional biotechnology Outreach Program, which we delivered at Lismore last week, at which he meets the Innovation Council and others in the industry. That networking opportunity gives him some ideas of ways in which to take his new idea forward. Basically, he gets into our system: he starts receiving our BioBusiness e-newsletter, goes onto our database when he is ready —which is a CD-ROM to be distributed around the world—and generally is able to access all the Department of State and Regional Development [DSRD] programs.

On the basis of this novel idea, this person may then win a fellowship under the Bio*First* Program to attend relevant industry conferences with a commercialisation process. At this early stage we would also be offering what we call an enterprise workshop, which has a special biotechnology stream. That works particularly well because companies such as Cochlear Ltd and ResMed send participants to that type of workshop. We would perhaps place them in a commercialisation boot camp, which we would run with the Australian Institute for Commercialisation or a similar organisation. As a result that person might form a company, which, for the purpose of this exercise, we are calling FermMax Pty Ltd. The company then becomes eligible for a number of forms of assistance. In the first case the business may need IP protection. It must work with a number of groups to get started and to meet the costs associated with setting up a biotech business.

The company might also find through some of its networking opportunities that it can attract seed funding to pay for the early capital costs and, as it attempts to prove its idea about the increased speed of cell selection, it might win a Commonwealth Biotechnology Innovation Fund grant, at which time it would also become eligible for a Proof-of-Concept grant administered by our department, which demonstrates the commercial viability of the process. If it is moving along quite well and the proof-of-concept is looking good we would then give the company an opportunity to pitch to industry organisations at the AVCAL AusBiotech CEO Breakfast series, for example, which we sponsor. Before he does that the entrepreneur would receive pitch and presentation training. After successfully attending the AVCAL breakfast, he might receive some more money and be ready to scale up the technology and move towards the company's first sale.
~break/rowland

Again, there are more networking opportunities through the student careers night to meet with people within the industry and the company is ready to go global from the first moment. So they would apply for membership of our Australian Technology Showcase [ATS] program and again link into the various networking events that occur there. This would be biotechnology specific activity as well as broader CEO forums with other ATS companies and other ATS mentors, including companies such as ResMed. So he learned a little bit about growing his business and internationalisation issues and he receives some government funding to assist his international marketing.

The Australian Technology Showcase program also includes a number of exhibitions and seminars. As I said, there is a continual working process through these various events. Having succeeded over a period of time, the company is now ready to take on international markets in a big way and part of our marketing and promotion strategy under the biotechnology strategy is to go to the leading Biotech events in the world each year, which is Bio, and we would be getting this company ready for, say, Bio2005 which will be held in Philadelphia. If it was able to be rushed he might go to San Francisco next year but we would be looking for a longer term development to make sure that he was ready at that stage, in which case he would participate in the national pavilion. We would provide some subsidies for the booth and the various business matchmaking services which would be delivered in conjunction with Austrade and through the various contacts that the person could make at that event they would perhaps be able to secure a technology transfer agreement with a European multinational. So that end result—a sale—is where we would be able to measure the effectiveness of the various elements of our program.

Over the page there is an example of one of the companies that is currently receiving assistance both under our Biotechnology program and under the Australian Technology Showcase. It is a regional company called USCOM which does the ultrasonic cardiac monitor and there are some specific examples of where the company has been able to use the various grants. We are working very

closely with them on each stage of the way through. They participated in BIO2002 last year in Toronto, which has generated some very good leads for the company. They also participated in a mission to India and they are participating in our mission to MEDICA at the end of the year, which is the largest medical devices network show in the world. We also featured them in the New South Wales Biotech newsletter when they were looking for distributors overseas.

As a result of that activity that company has raised GOOD of $1.5 million, their proof of concept project was completed, the product was launched recently by Minister Sartor, our non-research establishment costs have helped with the European CE marketing approvals—which are an important prerequisite for success in that market—and through our ATS program they have been linking into various European distributors which hopefully will lead to very good sales in a number of markets. We hope that their participation in MEDICA in November will enable them to sign up the rest of Europe. They are expecting to make their first shipments in the first quarter of next year.

CHAIR: Where it says, "The story starts here", you had a researcher at SCU—

Mr O'SULLIVAN: Southern Cross University.

CHAIR: There is a document, which all committee members have, called "Steps to commercialisation". Mr. Harris, to understand where the department fits in, on the example you just gave it seems that in relation to commercialisation of biotechnology there is an involvement in everything subsequent to the research stage.

Mr HARRIS: Yes.

CHAIR: With science generally outside of the bio strategy, at what point would the department become involved?

Mr HARRIS: In general it would be at the same sort of point. Our interest really emerges when there is a product. We do not have the capacity, nor indeed do I believe we should develop the capacity, to make the highly technical judgments on a product, or on the proposal to manufacture a product. There has to be a product and there has to be an opportunity for that product to become commercial. Really I suppose where we would see ourselves as being involved is anywhere from the “precede”, including “precede”, onwards. We rarely, if ever, touch on issues of pure science. Again, the bellwether for us is whether there is a commercialisation aspect.

CHAIR: How does the department ensure that money is being directed at the most viable commercial end without involving itself in picking winners?

Mr HARRIS: There are a couple of examples. It is best if I do it by example: the earliest experience we had was with the Australian Technology Showcase. With the ATS we applied the criteria that there would need to be a product and it would need to have the opportunity of commercialisation. We have advertised widely the availability of the ATS; our own business managers talk to companies that they are dealing with about the availability. The issue was, as you rightly identify, how to make that judgement. So we invited the New South Wales Innovation Council to become the filter, if you will. Applications are made to the department who provide them directly to the Innovation Council, the Innovation Council has a subcommittee which does evaluation and recommends whether they believe this is a product or an opportunity for a viable product that may well have a commercial future.

It has proved to be quite successful and I think one of the great strengths of it has been the willingness of the Innovation Council to exercise a great deal of rigour. We found in the very early days of this process that there was often an expectation from companies that made an application that simply because this was a "government program", that there would almost inevitably be an entry to the program. It is that degree of rigour that the Innovation Council has maintained that we have found has been particularly helpful.

In terms of a number of other aspects in the biotechnology area, Proof of Concept grants are quite an interesting area and we tie the process to that of the Commonwealth Government and there is an evaluation process that is under the auspices of the Commonwealth's Chief Scientist's Office: Dr

Batterham, and companies that become eligible for particular aspects of the Commonwealth's biotechnology scheme can then become eligible for our Proof of Concept funding. It is important to add that it is not just double-dipping, there is a weighting that is given to companies or research organisations when they make application to the Commonwealth, that favours those who can gain the support from their State government or from within the State. We have worked very closely with the Commonwealth departments and with our colleagues at the Commonwealth level and we have found that this is a very efficient mechanism that allows us to support companies that are going through the most rigorous valuation to not only ensure that we have got the right sort of product and the right sort of research capacity, but that we have also got a package that most benefits those companies. I suppose it is a rather long-winded way of saying we tend to tie ourselves to whoever is most able to assist us in terms of making those evaluations.

The Hon. PATRICIA FORSYTHE: In regard to the Proof of Concept grants you referred to the fact that the Commonwealth has a chief scientist position. Would New South Wales benefit from also having a chief scientist?

Mr HARRIS: l think that anything that can add to the breadth and depth of skill that is available in New South Wales is to be applauded. Whether to appoint a chief scientist, obviously, as you would be aware, would be a decision for the Government to make. But I think that at a time when the need to be keenly literate in these types of issues has become very important, personally I think it would be a great thing.

Mr IAN COHEN: Mr Harris, are there any New South Wales Government policies that specifically relate to these aspects of commercialisation?

Mr HARRIS: I am sorry, I am not entirely with you.

Mr IAN COHEN: Are there any Government policies that relate to the process of commercialisation that we are talking about, in terms of the steps that you see your department as taking most appropriately? Is there anything that is set down as a blueprint for this process, or is there any guide at a government level?

Mr HARRIS: The guidance that we take is that which applies to all business development activities—I suppose it is the charter under which the department as a whole operates—and that is to seek to develop opportunities for businesses in New South Wales. We are required to look for the best opportunities for companies to grow their businesses and we review this regularly each year as part of our own strategic planning activities. It seems to us that the area of biotechnology, innovation, medical devices, all of those areas are areas that offer real opportunities.

Those categories and strategies can change from year to year simply because of the commercial realities with work. For example, at the moment we find ourselves giving emphasis to financial services institutions where we know that we have got opportunities globally because of the change in the way that companies are controlling their global operations. So areas of emphasis move in and out of that priority list. At the moment it is part of the department's strategy to look at biotechnology and innovation.

Mr IAN COHEN: Do you have any restrictions at all on the sort of businesses—be they potentially profitable or for which research can indicate that there is opportunity there—I do not know how broad the concept of triple bottom line is in socio-economic and ecological terms, but is there any restriction or any criteria on the sort of businesses that you are supporting now?

Mr HARRIS: The question is an extremely good one because what happens, of course, is that the market place and the range of issues, products, developments that we deal with changes so rapidly that it is, I suppose, a classic example of regulators never keeping up with innovators. But I suppose it is a process of prudence that we exercise ourselves in that we would tend to consider any company's proposal or any product or any development that we were looking at within the context of the broader policies expressed by Government and we would seek, if we were in any doubt, the views of the Government.

The Hon. MELINDA PAVEY: How many applications would you have received to the Innovation Council in the past year and how many of those would have been successful?

Mr HARRIS: I do not know whether Michael can answer that. At the moment how many companies are in the ATS, Michael?

Mr O'SULLIVAN: We have got 350 in New South Wales and just over 400 nationally. It has tended to work out at around about 50 to 60 successful applications per year. About 80 per cent probably would be successful.

The Hon. MELINDA PAVEY: What happens to those that are not successful, that may have a good idea but have not reached the level of competence in their presentation or whatever? What advice do you give to those that have not quite made the grade? Where else can they go after that?

Mr O'SULLIVAN: I guess they would go back a step. There are various small-business programs and the business enterprise centres which the departments subcontracts that would be the source of information for those sorts of companies. Depending on the nature of the technology, they might be able to receive direct admission into other programs, otherwise they would be advised to go away for a number of months to, say, develop a business plan, to work with some consultants and work with the business enterprise centres and then come back when the technology is better developed or their own company infrastructure is better developed.

Mr HARRIS: We would be most unlikely to just fling them out. The Innovation Council would give them feedback on what they thought of the proposal. Generally, because of the way these proposals come forward, we have business development managers working through the 18 offices we have throughout the State, and it is most likely that those business development managers will be aware of the company. So if the company is unsuccessful in getting its product up within the ATS, as Michael says, there are a range of small business programs that we would be inclined to work with them on. I would hope that if a business development manager suggested to the company to go through this process, we would have the loyalty and gumption to stick with them and help them work up their product so that it was acceptable.

The Hon. PATRICIA FORSYTHE: You identified the Outreach program Regional BioBusiness, and you said that someone had a business idea that they might go for the BioBusiness e-newsletter. Can you advise the Committee whether the Innovation Council web site is maintained as a resource for those seeking to commercialise their IP?

Mr HARRIS: The Innovation Council web site, as far as I am aware—and I may well be wrong—is an information site to allow people to gain access to the Innovation Council and on which the Innovation Council has published a number of papers that it has produced over time. In terms of commercialising its IP, the Innovation Council really acts as their advisory body, so I would expect that if the company or an individual approached the Innovation Council it would put them in touch with one of the business development managers within the department. The Innovation Council itself does not have the physical resources to be able to undertake that activity.

The Hon. PATRICIA FORSYTHE: It would seem that if you follow the process and do a little clicking here and there, you end up at biotechnology, and if you go looking for what is happening it appears that it may not have been updated since perhaps some time in 2000, because it refers to the San Diego bioconference of 2001 as a place where you might see a coming event.

Mr O'SULLIVAN: There is an explanation for that. It is actually being looked at. Obviously, the various programs, such as the technology showcase and the small business web site, would be the main areas for specific information. The Innovation Council web site is one of a grouping; the department is putting a whole lot of them under the same server arrangements at the moment. So there is more expense in updating it now than there will be to get it right over the next couple of years.

The Hon. PATRICIA FORSYTHE: But you might accept that it is probably a good idea to keep it up to date?

Mr HARRIS: Yes.

The Hon. PATRICIA FORSYTHE: In your opinion, is there a need for whole-of-government co-ordination in the commercialisation process? Is that recognised by government agencies, and what emphasis is the Department of State and Regional Development undertaking to achieve greater co-ordination?

Mr HARRIS: I think there are probably opportunities that exist in a number of government agencies that actually are involved in research. There are always opportunities for those organisations to work closely together. In terms of a whole-of-government approach from my department's point of view, I would like to think we are fairly non-discriminatory in terms of our willingness to work with government agencies, the private sector, and any organisation that looks as if it has a product or a process that may well be able to reach commercialisation.

We tend to be quite inclusive in that we involve ourselves with other agencies and their activities, provide advice, provide access to business development managers or to officers from within the Innovation Unit. So we try to reach out as far as we can.

CHAIR: Would you explain the Innovation Council's structure, how it operates and who is on it?

Mr HARRIS: I will ask Mr O'Sullivan to do that. His division provides secretariat support for the Innovation Council.

Mr O'SULLIVAN: The Innovation Council is a ministerial advisory body established basically to help create jobs, investment and export through increased innovation in the private and public sectors. The Government advises the Minister and the Government on potential programs that it might look at. Biotechnology and the Australian Technology Showcase would be examples of where it has been involved. The council comments on Government initiatives to promote public and private sector innovation. At the moment one of the projects it is looking at is innovative thinking in young people, and there has been a series of meetings between a subcommittee of the Innovation Council and the Department of Education and Training to take that forward, and that is looking quite promising. Basically, the council provides general intelligence and information on issues of concern relating to innovation.

The council is chaired by Dennis Wade, the former head of research for Johnson & Johnson in Australia. He is also involved in the recently announced Steven Burrell biotechnology $200 million investment fund. There is a member of the Venture Capital Community, David Fisher; Merilyn Sleigh from Evagenics; Vivian McCarron from PricewaterhouseCoopers; adviser Liza-Jayne Locke from a public relations company. There are basically members to help with various elements across the range of innovation, services and advice. There is also Adam Liberman, a lawyer from Freehills. There are also two regional representatives, Christopher Dean from Thursday Island Tea Tree Plantations, and Soozy Smith, the head of Tunra, the commercialisation arm for the University of Newcastle. We will endeavour to supply the Committee with a list of members.

The Hon. CHRISTINE ROBERTSON: Could you also supply the terms of reference?

Mr O'SULLIVAN: Certainly.

The Hon. PATRICIA FORSYTHE: How could the New South Wales Government improve co-ordination between government departments in the commercialisation of scientific research?

Mr HARRIS: I have to say, I do not have a rabbit in my hat on that issue. The temptation is to say that the broader degree of discussion and co-ordination—it is a fairly classic bureaucratic answer, and there is something to be said for it. For example, I was in Canberra about six weeks ago when I addressed the Commonwealth's Co-ordination Committee. I think there were probably somewhere between 30 and 40 people in the room. You have to wonder at the efficacy of a committee of that size. I am sure that my Commonwealth colleagues make it work extremely efficiently. But I

must confess, at one small moment I did wonder how well this can work. Nonetheless, I suppose the answer is: What else do you do? It is not easy to create a centralist organisation that can run a command process. There is a lot of opportunity to work with the private sector. I think some of the work that is being done, particularly by groups like AIG, in establishing the Australian InnovationXchange—I think that has been an extremely valuable step to take. It is to be seen how well it continues to work. There is a lot of private money—

The Hon. PATRICIA FORSYTHE: Was that process driven by AIG?

Mr HARRIS: It was actually driven by Sir William Tyree, and I think Sir William offered $1 million to support it. AIG then said it would be able to provide funding, provided we could work out a way to get help from the States and the Commonwealth. I must say, at that point they came to us, and we helped AIG in making approaches to the Commonwealth and the other States. The end result is that Minister McFarlane, the Federal Minister, launched this about three or four months ago and it looks very promising, I have to say, with all the States, the Commonwealth and the private sector, and it does provide a point of co-ordination.

The Hon. PATRICIA FORSYTHE: What about the role of something like the Australian Technology Park? Is that living up to expectations, as at least a site to gather research?

Mr HARRIS: I think it is. I think it is also important to recognise that this is slow work. It is sometimes frustrating for people in my own organisation, who sometimes get to work with projects that have much shorter time spans. But this is a long-term activity; this is building a base of credibility, a series of opportunities—often opportunities that are totally unrecognised until they begin to feed off themselves. I think the ATP has been a great concept; I think it is working well. I think that everyone would always like to see these things go faster, but I have to say that it has received nothing but accolades from international figures whom we work with who have visited and who have said universally this is the right thing to do. I think it does provide a point of focus. With 20 million people at the far end of the world, there will always be an issue of critical mass. It is very easy to be more famous in Sydney and much more difficult to be world famous in the rest of the world.

Mr O'SULLIVAN: I think two things will probably give it a little bit of momentum over the next few months. The biotech precinct is now starting to take off. There are six tenants in the biotech incubator out there, including some manufacturing facilities which are now being established. Construction is commencing on the first major building for the ICT Centre of Excellence, so I think there will be a critical mass of researchers in the ICT Centre of Excellence, and having the biotech incubator out there is very good because the convergence of technologies in both of those sectors provides a real platform for the future.

The Hon. TONY CATANZARITI: Mr Harris, in general, is there sufficient expertise in commercialisation in New South Wales Government agencies, and what level of advice does your department provide to researchers with potentially new products?

Mr HARRIS: My immediate reaction is yes, I think there is an appropriate level of expertise. The reason I say that is not because I would suggest that we have a huge depth of expertise that can cover all moments, but I think there is a great danger in the bureaucracy seeking to build up sufficient ability to cover all contingencies and all occasions when a lot of those skills change rapidly, change with the technologies that we deal with, or change with the new level of innovation, and are often best available from the private sector or by building partnerships between the Government and the private sector.

So I would suggest that organisations like the Australian Industry Group, the Institute for Commercialisation, which has been proposed by a range of governments and private sector individuals—I think the real opportunity is to work there. I think the most valuable role for government agencies is to provide broad-based business advice, directions on the best way to obtain a result, and referral or collaboration with a number of these private and government partnerships.

The Hon. TONY CATANZARITI: How important is it for scientists and technologists to have the skills and ability to move freely between industry public sector research institutions?

Mr HARRIS: Highly desirable, and not often achieved. I think it is extremely desirable that scientists and people with great technical skill have the capacity to move between those areas. From my experience, I would suggest that often people who have great scientific or technical capacity may from time to time find it difficult to make that transition. Hence the need to use, as well as one can, the vehicles that exist or can be created in partnerships between government, research institutions, universities and the private sector.

That allows people to undertake activities, in the case of a scientist or a technologist, to make a product commercial. It is a very complex area. It requires a depth of skill in legal issues, patent issues, financing and research protection. It requires skills that are not necessarily those that have been acquired through a lifetime of scientific research. So, if one can create a vehicle to assist that to happen, I think that is the most valuable thing that can be done.

CHAIR: We have had some evidence, mainly anecdotal, that in other countries that transition goes back and forth, that scientists do that far more readily. Are there any particular features of New South Wales or Australia that holds it back on being able to provide that sort of flexibility?

Mr HARRIS: I think probably the size of the market. I think it is something that occurs much more readily in Europe and North America where you have large institutions that gear themselves at an institutional level to allow and encourage that. If there are large research groups, large drug companies, many of which have budgets larger than small nations, they have the opportunity to provide that chance for people to move backwards and forwards. It is much harder if you are operating in a market the size of Australia—and this is not a criticism but a reality—because quite often the research team is very small as well.

Research teams can depend on one person. It is often difficult for them to move across into an organisation within Australia and although it is not the only reason it is probably one of many reasons that we see a lot of talented young Australians leaving the country to work with companies in other locations. I would not criticise that, but I think it is really important to try to work out some way to get them back at some point, if we can.

Mr IAN COHEN: Have you not worked out a way? Do you not have a strategy? Is this not one of the big issues about the brain drain to technological America, the fact that commercialisation and the universities are much more interlinked. Do you not have some sort of a strategy?

Mr HARRIS: All the States and the Commonwealth have worked towards this. I think we have recognised that if you can create opportunities that are appealing to these individuals, it allows them to return to Australia. Something like the national ICT Centre is a magnificent recognition of this where total funding in excess of $120 million will go into creating an ICT centre of excellence, which has sufficient critical mass to be attractive. There are also proposals to provide scholarships to allow talented young Australians to return. Indeed, under the Bio*First* process Bio*First* scholarships can provide funding to encourage young scientists to return to Australia. The Commonwealth too has similar processes. These are great opportunities but, as I said before, it is also a process that is fairly time consuming.

Mr IAN COHEN: Are you succeeding in getting people back? Do you have any figures on that? We see the number of people going overseas but do you have any figures on the success rate of attracting people back?

Mr HARRIS: No, not that I can produce now. We can check and see if there are some indications, but all of these programs are relatively new. I do not think we were having these discussions even four years ago and I think it is a timely recognition that this is an issue. We see signs of some scientists returning to Australia, particularly where they can see opportunities to work at world-class centres. I think that the reputations that are being built by organisations like the Garvan organisation, the Walter and Eliza Hall organisation and the Queensland Institute for Molecular Bioscience at the University of Queensland all help to provide a critical mass to encourage people to return to Australia but, very often, good researchers will stay where the research teams are.

The Hon. MELINDA PAVEY: Or the entrepreneurs?

Mr HARRIS: Or the entrepreneurs or, indeed, the money. You only have to look at the breadth and depth, and particularly the depth of the venture capital funds in Australia compared with, say, North America. It is simply a matter of market size.

Mr O'SULLIVAN: You may not be able to bring all of these people back in a hurry but the Consul General in New York has formed Young Australian Professionals in America, an organisation to cater for all Australians working over there in organisations such as at Harvard, and people working in the venture capital industry and in the banks. We are talking with them at the moment about joining that program because that allows us to help companies here access Australians in prominent positions in America and it also allows us to advertise positions of interest to them, so that they are getting feedback and information on what is occurring in Australia. We have agreed in principle to be part of that program.

The Hon. CHRISTINE ROBERTSON: What role does the Department of State and Regional Development play in the Co-operative Research Centre and how successful do you think the CRC program has been to date?

Mr HARRIS: The department funds no CRCs in New South Wales and has not done for several years. The department provides support to the CRCs in putting together the business case to seek Commonwealth funding. It is really a matter of broad philosophy, that we see ourselves collaborating with the Commonwealth Government and the private sector in whatever way we can in working with most CRC funding. The largest CRC funding obviously comes from the Commonwealth, and we provide an open-ended part, which has been taken up every year by a broad range of CRCs to work with our business development managers and current programs so that we can deliver the most valuable thing that we can provide, that is, to help them build the best possible case to seek CRC funding.

The Hon. MELINDA PAVEY: Since the establishment of Bio*First* in the past year, what opportunities have been created for commercialisation of research discoveries and does the Department of State and Regional Development liaise with the bio-unit within the Cabinet Office, to what degree and in what way?

Mr O'SULLIVAN: I can give you some examples. A couple of these examples are commercial in confidence, so if I give the company names or amounts of money, then it would be useful if we could protect them.

CHAIR: Would you prefer not to name the companies?

Mr HARRIS: In both instances that Michael has in mind, once you or, dare I suggest, a competitor is aware of the process, it will not take too long to work out the name of the company.

CHAIR: We will go in camera so you can provide the information. We will then go back into public session and ask questions about the principles. If any of those questions transgress, you can inform us. That way we will have some information we can use for our report as well as the background you are offering to provide.

Mr HARRIS: Absolutely.

(Evidence continued in camera)

(Public hearing resumed)

The Hon. MELINDA PAVEY: What opportunities does the Government's Bio*First* provide for the commercialisation of research?

Mr O'SULLIVAN: The example we gave at the beginning. It depends on how we link in; it is very much at the information stage. There is a series of networks that companies can link into; there are various information services online for innovators through the Australian InnovationXchange and other programs. We also run programs through our Business Enterprise Centres where researchers can get information.

The Hon. MELINDA PAVEY: How does the Department of State and Regional Development liaise with the BioUnit within the Cabinet Office?

Mr O'SULLIVAN: There are two areas. First there is a Bio*First* officers meeting so agencies such as Health, Agriculture, the Office of Information Technology on some subjects, the Cabinet Office and ourselves, have monthly meetings to ascertain how each program is running and where we can co-ordinate our activities.

The Hon. MELINDA PAVEY: How does the $68 million Bio*First* program place New South Wales in the drive towards greater commercialisation compared to Victoria and Queensland? anecdotally during the hearings signs as researchers and professors around Australia seem to think that Victoria and Queensland have got away from us. Will Bio*First* help us catch up and take over?

Mr O'SULLIVAN: There are two elements to that question. One might be the distribution of Federal funding under the Major National Research Facilities and the Australian Research Centres of Excellence program in which New South Wales has tended to go fairly well. Some States have thought they were underfunded in some programs and, therefore, initiated their own programs. From our perspective we were quite happy to work on a complementary basis with the Federal Government and support the national research priorities in those areas.

Mr HARRIS: Also, I think the story has been sold harder in Victoria and Queensland.

The Hon. PATRICIA FORSYTHE: They have done a good job.

Mr HARRIS: They have done an excellent job. They have raised the awareness of biotechnology. My view is it does not necessarily match, it cannot be weighted exactly on a dollar basis. A number of opportunities exist in New South Wales and biotechnology is almost, by definition, a natural fragmenter. Biotechnology research will be conducted in a number of places throughout the country: as I mentioned before the Walter and Eliza Hall facility in Melbourne, the Garvan Institute in Sydney, the work done on subtropical and tropical plants at Southern Cross University, and the marine research work at James Cook University. I am hopeful that the biodiversity available in Australia will produce a range of biotechnology outcomes.

One of the most important factors for New South Wales lies in that commercialisation area, because with 70 per cent of national financial institutions based in New South Wales, with the venture capital groups essentially based here, and expertise in intellectual property protection based in New South Wales, it is part of a continuum that provides a national benefit. The emphasis placed on biotechnology research in New South Wales is appropriate. It provides great opportunities, but by the same token would not discourage the amount of work done in other States.

The Hon. MELINDA PAVEY: Why was biotechnology chosen as the only specific government science or innovation unit in New South Wales?

Mr HARRIS: I do not know why it was chosen as the only science unit. From my department's point of view we believe that there was such a global emphasis placed on opportunities in biotechnology that in terms of a business development agency it would have been quite remiss of us to not pursue it as vigorously as we could; in the same way we saw IT become a remarkably successful global vehicle. We felt that biotechnology offered the same opportunities. Certainly our research as part of our own planning would indicate that there were opportunities. It also seemed that

with the skill in IT based in New South Wales and the increasing requirement for large amounts of IT horsepower in biotechnology research, that it placed us very well if we were to place some emphasis on biotechnology. As part of our process, biotechnology suggests itself very readily as an area on which to concentrate.

The Hon. CHRISTINE ROBERTSON: Was your department part of the decision-making process for this emphasis?

Mr HARRIS: Yes. I do not know whether I would gather all glory to ourselves, but we certainly believe it was very important and that was part of the influence, yes.

The Hon. MELINDA PAVEY: Does it concern you that Victoria has more dedicated biotechnology companies than any other States? Victoria claims to be ahead on national biomedical research with the largest concentration of research institutes and the highest spending on medical and health research and development.

Mr HARRIS: I am in the economic promotion business. I can produce figures that would match the Victorian figures, probably just as readily. Often it is all in the way you tell the story. From memory, the core issues are—on the last figures I saw, which were from Ernst and Young—Victoria has just over 30 per cent of what were defined as core biotechnology companies. New South Wales had 29 per cent, so there was probably a difference of 1 or 1.5 per cent. The Australian Bureau of Statistics [ABS] definitions, which include medical devices for Australian purposes in biotechnology, New South Wales has about 40 per cent of all biotechnology companies, which far exceeds the number in Victoria because their numbers do not move when devices are included, or not very much. If you include pharmaceutical companies as well as the ABS definition of biotechnology companies, the figure for New South Wales runs over 70 per cent.

CHAIR: Mr Harris, in different submissions the Committee has been presented with interstate comparisons in various forms. Would it be possible for the department to provide interstate comparisons as the department sees them?

Mr HARRIS: Certainly.

CHAIR: There are five, six or seven different ways of looking at the statistics.

Mr HARRIS: Mr Chairman, I appreciate the dilemma.

The Hon. PATRICIA FORSYTHE: You are also in the business of promoting the State. Some peak bodies that have addressed the Committee have not been complimentary in comparisons with Victoria and Queensland. Perhaps it is in selling the story as much as in the hard evidence.

Mr HARRIS: Yes.

The Hon. PATRICIA FORSYTHE: If that is the case, these agencies were giving a strong picture of other States. If they are advising companies about where to go to be part of a cluster they will talk about States other than New South Wales. What are we to do about that?

Mr HARRIS: We try to tell the story as well as we can. We pitch at companies as well as we can. We have often been through similar discussions in relation to regional headquarters and regional operating centres. I have been told on numerous occasions how much more successful other States have been than has New South Wales in terms of recruiting regional headquarters and regional operating centres. Indeed the majority are implicitly located in other places. We know, because we share the figures amongst the States and with the Federal Government, that 65 per cent of regional headquarters and regional operating centres are in Sydney. We know that just over 19 per cent are in Melbourne. We know that 6 per cent are in Brisbane. Often there is a reluctance to accept that broadly.

The Hon. PATRICIA FORSYTHE: If in part it is an issue of perception, does it matter that we see Premiers of other States attending the bioconference that is held each year in the United States

of America? Is New South Wales losing out because, apparently, Premiers or senior Ministers from New South Wales have not been in attendance although other States have been well represented?

Mr HARRIS: New South Wales has been at every bioconference for 10 years.

The Hon. CHRISTINE ROBERTSON: Who went?

Mr HARRIS: On one occasion it was led by a member of the Innovation Council. Last year I led the delegation. I would have to look at our records for the others.

The Hon. PATRICIA FORSYTHE: Would it help to have the Premier or Minister in attendance?

Mr HARRIS: It is always important to provide the strongest representation one possibly can.

The Hon. CHRISTINE ROBERTSON: I return to the emphasis on biotechnology. You have stated that that is appropriate and that is where we are. Are you hearing different views? Is it an appropriate view that biotechnology is our only emphasis, our major emphasis, or almost our only emphasis?

Mr HARRIS: I will answer your question in two parts. There are always criticisms of various sorts. I have not had the sort of criticism you are seeking. We probably had less criticism because we tend to see biotechnology in the same light as the Australian Bureau of Statistics; that medical devices have been very strong in New South Wales and we continue to support medical devices very strongly within the biostrategy. I suppose one could create an argument that if biotechnology is purely life sciences and is related to biodiversity issues you may not include medical devices.

However, because we do that means we get a much broader coverage of companies and organisations that we deal with. As Michael mentioned, we find ourselves dealing with ResMed, for example, Peter Farrell's company. That company has about $2.5 billion listed on the New York stock exchange. Companies such as Cochlear Ltd, which has continued its research work in New South Wales, dominate global markets for many products. We have a broad range of companies that we deal with. That may well have insulated us from that sort of criticism.

CHAIR: If one of the strengths is that we have adopted a very broad definition of biotechnology, is it implicit that there are still areas of science which would get a tick in potential for commercialisation in every other way, but simply do not fit within the pot of gold and we are not able to provide them with the level of assistance which commercially would make sense?

Mr HARRIS: It would be a brave to say no because there are a number of activities, many of which may not drift on to our screen or which any organisation—and it is not a criticism of New South Wales—may not have the resources to do at any particular time.

Mr O'SULLIVAN: Because of some areas in the Major National Research Facilities, we are doing some work on nanotechnology and that might be an area which receives a stronger degree of focus at the moment.

CHAIR: Nanotechnology and ICT are two that have been raised many times?

Mr O'SULLIVAN: When there are significant investments in things like the ICT Centre of Excellence and the Government's support for the Major National Research Facilities and the Centres of excellence, we are looking for those sorts of organisations to produce the spin outs that will more directly involve us. At that initial stage we are probably providing the supplementary funding and trying to help in establishing the framework, but it is when those spin outs emerge from the Centres of excellence and the Major National Research Facilities that we will get active. I think even in terms of the nano developments out at the University of Sydney, one of its most positive initiatives is that it has just signed a joint venture arrangement with BHP Billiton to look at some developments in coking coal. It is a developing process. This program has been running for one or two years and now you are

actually starting to see linkages with the major industry players in Australia, and that is the sort of thing on which we would be looking to build.

Mr HARRIS: So often, the things that emerge as the most successful are things that, to be truthful, we would not necessarily have even picked or thought of, for instance, the work that Redfern Photonics has done. I am sure that all the members of the committee are keenly and clearly aware of all the issues surrounding photonics, but we may not have actually determined that photonics was an area of higher prospectivity. So, it is to provide that broader range as best we can.

Mr IAN COHEN: From where should you get that information? What feelers do you have in your department? Who is out there scouting or looking for that cutting edge of innovation? We were told by an earlier witness that somehow New South Wales missed the boat on C-21 initiatives, a coal initiative that has been taken by Queensland. Are you aware of that?

Mr HARRIS: No, I am not.

Mr IAN COHEN: I notice you mentioned Christopher Dean, Thursday Plantations, and North Coast issues which are very much cutting edge in a small scale of any innovative land use issues. Your organisation has established credit in medical equipment and information technology, but how do you search out those new areas?

Mr HARRIS: It is the needle in the haystack in some ways. The best way to do that is to provide a vehicle to allow that information to come to us. The Australian Technology Showcase [ATS] provides an opportunity for companies who believe they have a project with a prospect to come through the ATS. The contacts we make through our business development managers throughout the State means that they are constantly looking for companies that have prospects to grow their business. That led us to companies—speaking of the North Coast—such as Permodrive which is a good example.

Mr IAN COHEN: Did you pick up on Permodrive or did they pick up on you? What was the process?

Mr O'SULLIVAN: They were admitted to the technology showcase in 1998 and we began working with them.

Mr HARRIS: Did we encourage them to join the ATS?

Mr O'SULLIVAN: I think we did through Sue Ryan, our business development manager for the North Coast. She was encouraging all the innovative technologies to join up, so Permodrive applied for membership. They were in the very early stages and they went into an event called Technomart on the Gold Coast when they had very limited funds. It was supposedly an APEC-linked promotion but somebody did not do their due diligence on the operators and it collapsed on the first day. This company had spent a lot of money trying to showcase itself. I remember running around with the company on the second day with Vivien McCarron from PricewaterhouseCoopers just introducing them to venture capitalist and basically trying to do whatever we could to keep them steady and all the rest of it over the next few months.

We made some introductions, and then they finished up weathering the storm. They got some fantastic local support. They have attracted great investment interest from basically the mums and dads on the North Coast. As they have come into the ATS program we have helped with some of their intellectual property protection. We funded one of their visits to America to foster their discussions with the United States of America Army and with the DANA Corporation. Now they are progressing quite well.

The Hon. MELINDA PAVEY: Another Coffs Harbour firm.

Mr IAN COHEN: They have a little place in Ballina as well. It sounds as though that has developed into an amazing success story but, correct me if I am wrong, I understand the United States Army has actually taken up to buy a component for much of their trucking fleet? That is a massive

spare part. How do the taxpayers of New South Wales benefit out of this major leap into the American market?

Mr HARRIS: Through growth in employment in the company itself. They have grown and will continue to grow if they make those sales to the United States. There will be manufacturing and design work done in Australia.

Mr IAN COHEN: Will the United States manufacture, through some agreement with Permodrive?

Mr HARRIS: They might, but I imagine that the ownership and royalty arrangements will certainly ensure a benefit back to Australia. Global manufacturing is something that you cannot necessarily keep manufacturing in any one place. I would imagine that with a project like the United States Army, an agreement will be reached in much the same way as Bob Clifford reached an agreement on the fast wave piercing catamarans from Tasmania. There will certainly be a significant financial benefit back to Australia.

Also, if it goes further there is a lot of hope with Permodrive that the company might have a very good product for garbage trucks, for instance, particularly for use in large cities where the storage of the energy means that you can cut down the cost of operating those vehicles. That may well end up in manufacture in a number of places because the product is pretty heavy. But we see it all the time, to control the intellectual property and the design activities that go on would be a great benefit to our economy, simply because of the number of people they would employ and the level of skills that they require and engender.

I am trying to recall a company as I speak, called something-Air which provides the airconditioning units that go in the tops of railway trains in France and Germany, most of which are actually manufactured in Wales but all of the design work and quality control work is done out of here. They actually go online overnight. They have a team of somewhere between 50 and 100 designers and engineers working here who go online to the plant at the back of Llanelli, somewhere in Wales, to them. So, yes, there is a genuine benefit.

Mr O'SULLIVAN: We stayed in contact with some of these developments. The Innovation Council has one regional meeting each year and organises presentations by Southern Cross University and then visit companies such as Permodrive and other emerging technology companies in the region. They would be a primary source of that activity. Then we run Regional Biotechnology Outreach Programs and there is a series of regional seminars that are tapped into local universities and other organisations to be able to try to find out the prominent issues for industry generally, but specifically in some of the regions.

Mr HARRIS: This is a really interesting issue: it is the prospecting issue. There are 370,000 companies in New South Wales. How do you filter them? It is the very question asked by Mr Cohen. How do we get a hold of these people? We try to create, as I said earlier, a vehicle all the time. The ATS has held displays—I am not too sure how many. For example, during the Olympic Games more than 100 ATS companies came through the Hordern Pavilion and thousands of people visited, not mums and dads, but targeted potential in companies that might have some involvement. That also spreads the word to those companies and to their operatives that there is an opportunity to undertake this work, and that they can work with us on these things.

Every couple of months we now hold a breakfast with the Australian Venture Capital Association [AVCA Limited] which attracts, on average, between 60 and 100 people to that breakfast. I think they pay for themselves. We hold those breakfasts and the deal is that we have atleast one New South Wales company that pitches. Two companies pitch, sometimes one of those companies can come from out of State. Recently, a biotechnology group from Victoria talked to the AVCA Limited breakfast. It is a way to gather all these people together at the one place at the one time. It is a numbers game. We have got to try to work out how to multiply that word. One cannot do it by just popping an advertisement in the paper or by giving another interview one really has to multiply.

The Hon. PATRICIA FORSYTHE: Would you provide information on the technology showcase in the context of this inquiry?

Mr HARRIS: Yes.

The Hon. MELINDA PAVEY: And an invitation to the breakfast.

Mr HARRIS: The committee would be welcome at an AVCA Limited breakfast and would find it very interesting. I go, I think they are great.

The Hon. MELINDA PAVEY: Coincidentally, on my flight this morning was Ron Phillips from USCOM who was very complimentary of the Department of State and Regional Development, particularly Mr Harris. What is your broader response to the issue of technology and research within our university about getting stuck there or getting venture capital? You have told us some good news stories which are fantastic but it is not all good news. The committee has listened to some of the proposals about it becoming a bottleneck; if you have this silver bullet or unlimited funding or whatever, what would your answer to that issue be?

Mr HARRIS: The unlimited funding is generally one put forward by the universities, in my experience. There is no problem that cannot be solved without lashings of money. That may well be true but I cannot help but notice the consistency of that view. The universities struggle themselves to find commercialisation opportunities. I do not think there is a university in Australia that does not have a commercialisation unit, often grandly titled. Some of them from to time are quite successful. They have individual products with which they are successful, but a great many products do get stuck. I suppose, my answer would be that as slow and, at times, as frustrating as it may be the path on which we are at the moment in trying to create vehicles to allow organisations, individuals and those who have a commitment to a research project or a product and to find any number of opportunities to take their product towards commercialisation, is really the way to go.

We can do more of it, and that is really important. It was interesting that when I spoke to the Chief Scientists Committee in Canberra they too were aware of all of the comments that this committee has heard and, indeed, the criticisms and regrets and all sort of things that occur. That is what they do for a living. They are keenly aware of it and of the comparison amongst the States, but they have made the point publicly there and since, that they think we are probably more advanced in terms of our approaches to commercialisation than perhaps some of our colleagues are. We have had to take a few lumps for it along the way because it is often easier to simply replicate programs that exist or to push more money at something.

It often requires a greater degree of discipline and, dare I suggest on the part of some of my colleagues who work in this field day to day, a bit of courage to stand there and to try to help companies go down that commercialisation path by creating vehicles of opportunity. Hence our support for things like the Australian InnovationXchange, the Institute for Commercialisation and so on.

CHAIR: What are the key differences for the department in commercialising science to any of the other State development projects you become involved with?

Mr HARRIS: I suppose the truth is probably not a lot from our point of view. The value that we provide that is the greatest is access to a range of business development programs, business support programs, marketing opportunities, promotional opportunities and, I suppose, erecting road signs as to where opportunities, support, funding and vehicles may be found. We do that with virtually any business proposal that comes our way. Obviously, with some of the larger investment projects we work with, there are extraordinary levels of expertise available to the companies. They know their business well. They know exactly what they need from us. We know what we can do to support them.

The difference is that at the start up end, at the research heading towards commercialisation, the prospect of going to this preceding level that you have here, companies or individuals are often relatively ill prepared. We treat them in much the same way as we would a small to medium enterprise that has real prospects. There is a great similarity between the way we treat all businesses in all of their activities.

Mr O'SULLIVAN: One thing would be to be active in various forums. We have a very strong working relationship with the New South Wales branch of AusBiotech. That involves being on their promotional committee. It means talking at various events. It means going to AusBiotech and talking about what New South Wales offers for biotech companies. We have sponsored—we do not do a lot of sponsorship and generally for only small amounts of money but some specific conferences such as Medic III, the Commercialisation of Health Innovations Forum, and things like that where there are opportunities for companies or researchers with a commercial interest who are likely to attend those sorts of conferences to find out what the department can do.

Our sponsorship generally involves trying to pick a number of those better developed technologies or ideas and giving them a chance to pitch at the conference. We have tended to sponsor the pitching session so that they get a chance to refine their ideas and pitch to an audience that knows something about their business.

(The witnesses withdrew)

PETER JAMES BOOTH, Deputy Vice-Chancellor, Academic, University of Technology, Sydney, PO Box 123, Broadway, New South Wales,

SHANNY LEIGH DYER, Head of Commercialisation, University of Technology, Sydney, PO Box 123, Broadway, New South Wales, and

STEPHAN JOHN WELLINK, Director of Research and Development, University of Technology, Sydney, Level 7, Tower Building, Broadway, New South Wales, sworn and examined:

CHAIR: In what capacity are you appearing before the Committee?

Mr WELLINK: As a representative of an organisation.

Dr DYER: As a representative.

Professor BOOTH: As a representative.

CHAIR: If you should consider at any stage during your evidence that certain evidence or documents you may wish to present should be heard or seen in private by the Committee, the Committee will consider your request. However, the Committee or the Legislative Council may subsequently publish the evidence if they decide it is in the public interest to do so. I invite you to make an opening statement.

Professor BOOTH: I would like to make a general opening statement and my colleagues, who have greater depth of knowledge than me, will fill in the detail. Thank you for the opportunity to speak to you today and for receiving our written submission. I have attended today as a senior representative of the university to indicate how significant we feel this inquiry is. Commercialisation of research, particularly science research, is an increasingly important area for universities, and I know that all the State's universities take this issue very seriously. We have a great interest in this inquiry and where it will lead us because we feel there are lots of potential road blocks and other things that can get in the way. It is a very dangerous route to commercialisation, in many senses.

The University of Technology, Sydney [UTS] thinks that the State, through the Department of State and Regional Development, has a lot of existing programs in place which are quite useful, and we have received lots of enthusiastic support from the department in terms of our initiatives and so on. We would like to commend the existing things that the State has done. However, we believe that effective and efficient transfer of research results to commercialisation activities is a prime issue. It is not always one that we want to have; it is one for a very small percentage of research, and the small percentage that get to the commercialisation stage that actually succeed are another small percentage. So it is a high-risk activity in that sense.

That means that we must ensure that there is no wastage along the way or as little wastage as possible due to ineffective processes in that inefficient transfer. UTS has started to focus heavily on research and development transfer in the past few years. We have internally reorganised our own commercialisation activities to get rid of some of our internal inefficiencies in doing so to lead to better identification of opportunities at the earliest possible stage to bring to bear appropriate expertise such as my colleagues here who have experience of research and development transfer to commercialisation so that they can facilitate that and through forming appropriate partnerships and linkages with outside bodies in a whole range of areas to facilitate that efficient transfer.

We have also reorganised our own research platforms to reposition ourselves into areas where we think we have the best chance of delivering high-quality research and where a small percentage of opportunities for commercialisation might arise. We have established some advanced research institutes where we have concentrated our activities into areas where we feel there is long-turn potential, such as in nanotechnology, biotechnology and water resources, to name three main ones where we see significant opportunities and where UTS has some comparative advantage.

We are also working generally in the health sciences field because we know there are significant opportunities there, and we have very good connections to a whole range of New South

Wales organisations. We are forming lots of commercial linkages. We are about to sign an arrangement with Alcatel to become one of their regional research providers and their international relationships. We have a relationship with Novartis and IBM, and we work in a range of other collaborative things such as cooperative research centres, CSIRO, ARC centres of excellence and so on which you would be aware of. All of these lead to a very complex range of relationships that must be managed.

We attend forums, such as Bio, the major biotechnology conference in the world, to benchmark and linkage ourselves. We particularly think that in the science fields of biotechnology, relevant areas of engineering and information technology [IT], which we would see in the science fields, plus linked with our business strengths in terms of helping with the commercialisation plans of businesses. Also, we have some particular expertise in strategic alliances and so on that can help those more science-based areas move on. As a matter of fact, one general comment we would make that is not in our submission is that one should not draw science and commercialisation too narrowly. There is an issue of the social significance of research and bringing our humanities and businesspeople to bear on science projects and their commercialisation is equally important.

For instance, our Institute for Sustainable Futures has a large input into a number of those areas. A few years ago UTS decided that its traditional approach to research commercialisation, which was basically licensing and selling off IP, was not the long-term future for this approach, and we decided to invest more heavily in start-up companies. Since then, we have had a number of spin offs such as PacMab, AI Medics and Avolution. Avolution won an award for excellence in 2003 in Australia.

We are also into what might be called novel technologies, such as Mind Switch, which is a way of using people's mental electricity to run devices, particularly appropriate for full paraplegics, and so on, that they might be able to control devices without manual intervention. UTS also developed a heart device technology that is being used by Ventricore, an Australian Stock Exchange-listed company, which has performed very highly in 2003. That heart device is undergoing clinical trials in Melbourne at this time.

Some examples of technology where UTS has backed off to being a shareholder, because we have passed the technology that was beyond our ability to develop further on to a commercial venture, there is an issue of moving through those transfer steps. That has got to where someone else was able to attract the capital and manage the clinical trials, and so on, to take the technology to a commercial end that the university could never have undertaken—because of the risk involved, the capital required and the expertise required. But moving it from the university sector to that company was a significant learning process and fraught with lots of difficulties about intellectual property ownership, and so on. It was not an easy transfer to manage. It was not a seamless, efficient process of moving to a commercial setting.

I am sorry for the length of that background but I just wanted to give you that to show you the diversity of activities going on within the UTS's approach to commercialisation. In our submission we outlined a number of areas where we saw particular gains could be made. First was in the policies area. We think it is critical that the New South Wales public sector has consistent policies on commercialisation, particularly on IP issues. UTS has strong linkages, for example, with a number of the area health services. We have joint research going on with a number of area health services. Those health services do not have clear IP policies. Therefore, it is very difficult for us to know how to negotiate and arrange appropriate arrangements at the start of the process. Unless you get the IP issues sorted out when you start the research, you end up in a lot of trouble when you get to the commercialisation stage. If you have a framework for engaging at the start, when you get to commercialisation of whatever it is—the 1 per cent to 3 per cent of research that leads to commercial outcomes—you know where you are going. But, if you do not have that clear at the start, there is a significant problem. We believe if all New South Wales public sector entities that engage in research had clear IP policies, at least we and other universities would know our negotiating grounds and where we start.

Similarly, we feel it would be very useful for there to be a clear statement about commercialisation of science for the State. Queensland, as you have probably seen, has not only a Smart-State technology but underlying that is a whole range of very clear approaches to

commercialisation and what the State is doing. In our opinion, New South Wales does not have such a clear statement that the universities can engage with, to know how to position themselves and to give us some policy certainty. To engage in commercialisation one needs policy certainty for a significant length of time. We are talking about 10-year periods. We cannot be investing in that focused institute thing to find that five years down the track someone has shifted the policy landscape on us and we waste a great deal of money.

The second point we wanted to make it about insurance. Our insurance levels and our requirements under our Act to be fully insured for commercial activities, except the very low levels of risk, put us in a difficult position when it comes to that first level of commercialisation, such as clinical trials. At the present time we cannot get insurance for clinical trials in New South Wales. We are not allowed under our Act to undertake activities where there is too much exposure to risk. So, without insurance we are dead in the water for certain areas of commercialisation. We are not advocating that we should be able to commercialise at our whim, but we are saying that unless we can access insurance we will have to walk away from opportunities. In one case we lost an opportunity to Queensland because the University of Queensland was able to provide insurance for the clinical trials and we were not. So, we had to walk away from an opportunity we had.

Mr IAN COHEN: Is that a State insurance you are talking about there?

Professor BOOTH: Queensland State, to our understanding, helped underwrite the access to insurance, which we could not get through the normal commercial avenues in Australia.

Mr IAN COHEN: Did you speak to the New South Wales Government?

Professor BOOTH: It was too late. By the time we learned that, the opportunity had gone. We would have approached, if we had that amount of time. They are two specific areas. The third point we raised with our ministerial advisory support. Commercialisation of science research is a very broad and complex area. There are many specialised areas of science that have high levels of expertise required to advise on appropriate commercialisation policy, and so on. Biotech is quite different from our agricultural science, or from water resources, or whatever. That breadth of expertise, we do not believe in the current structures, is adequately tapped. We would like to suggest that a broader set of advisory services—something maybe like the Prime Minister's science and engineering innovation council, or other models could be looked at, as a way to tap in the appropriate levels of expertise around the State in specific areas, and so on.

The fourth point was about block funding for research, which we know is not a State government initiative but is a Federal government responsibility under the Department of Education, Science and Training. However, we would ask you to consider perhaps lobbying appropriate bodies for block funding arrangements for universities, to recognise the importance of commercialisation. At present, we are rewarded for many avenues of our research performance, but one we are not rewarded for is commercialisation of research. I will give you an example of how this can cause a problem internally for the university. We might be running an engineering project that is being funded by a company as a research and development grant. It is going through those initial stages of research. The money comes into the university as a research contract and we are able to count that and get appropriate recognition for that under Federal funding formulas. That grant then produces a product that looks like it is commercialisable. We then sign another arrangement with the same company to try to develop that product further so that it can see whether it can take it to an appropriate product-development stage.

At that point we might sign a commercialisation deal with them, where they take it semi in-house. They are now investing in what they see as a product. We are doing further research on it and being recompensed for that. We do not get to count that stage as research income. That is excluded from the definitions of research performance. So, our researchers, who are very switched on to their careers, and so on, say why should I put my time into that when I can get another grant that counts, and counts for the university and my career? All they can see is maybe some equity in a company that might take off and they might make a bit of money out of it, but that is a long-term end that they might see as tangential to getting another research grant.

In the US higher education sector those sorts of commercialisation examples I have just given you count. So, there are better incentive structures for academics to stay engaged with a project all the way through. Teaching commercialisation skills, we think is important. We have suggested that there might be some usefulness for the State in having some semi-accreditation for standardisation of the quality of those so everyone is assured they are delivering the appropriate skills. We are addressing some of those things through our own internal auspices, by sending people to enterprise workshops that are run in New South Wales and which we find very useful.

The Hon. MELINDA PAVEY: Who runs those?

Dr DYER: It is organised by a private company, but UTS is one of the supporters of the enterprise workshops, so we add to the teaching of that.

Professor BOOTH: I can also give you the details of that if you like. We are also setting up our own internal entrepreneurs club, which the Department of State and Regional Development is going to help us as sponsor to encourage people to self-learn and self-support, and so on. We believe a moratorium on genetically modified organisms is not necessarily appropriate for Australia, particularly for the New South Wales position in Biotech. We would rather see all the States working with the Office of Gene Technology Regulator, to give a more consistent approach to that complex area. This is a complex area, and there should be appropriate debate about the appropriate way to deal with genetically modified organisms, but we do not believe the State's current moratorium position is the right way to facilitate further research and commercialisation of it.

Finally, the State has set up a number of commercialisation vehicles. Going back to our first point, if one is going to have a consistent plan of how to engage, one has to fully understand all the avenues. We do not believe it is very clear at this time how those vehicles work, what their accountabilities are, what their objectives are and what the key performance indicators are. If we could have a greater clarity on such issues for any vehicles the State Government supports or sponsors—especially when they seem to us to be working in very similar spaces, to be competing with each other effectively—how can we engage with them? I am sorry for my long-winded submission. We are happy to answer any questions.

CHAIR: I should put on record that I am a member of the Council of UTS. First, how does UTS structure its commercialisation?

Mr WELLINK: We handle commercialisation through the research and development office. My understanding is that that makes us a unique university, because every other university has a stand alone commercialisation company to handle commercialisation of technology. We have chosen this different type of model because we are trying to get better synergy between the grants development area and commercialisation at the very first opportunity. If IP is going to be generated it is going to happen at discovery, and it is better to have people with commercialisation expertise working quickly and very soon after Australian Research Council grants, for example, are given to researchers. Trying to get synergy between the competitive grants and the pointy end—commercialisation—as soon as possible. Identify the IP, work out the path, mark it as early as possible and give the opportunity a chance.

CHAIR: It has been suggested that it would be of benefit to scientists if there were central points of advice for IP rather than each university having to reinvent the wheel. Does UTS have a position on that?

Professor BOOTH: It is an interesting point. In general, IP issues, we believe, have adequate advice. However, I think you are talking about much more specialised IP advice in more complex areas, particularly the different vehicles for commercialising it. Yes, it is very expensive for us on one-off occasions to tap advice. We might have that sort of advice once every five years but across the university sector there is probably greater need to retap that sort of advice..

CHAIR: When you say very expensive, can you be more indicative?

Dr DYER: For example, if you were looking at advice on commercialisation of intellectual property in the United States, you could spend between $5,000 and $10,000 Australian to get that

advice from a United States attorney. That is really quite expensive. But to answer another part of your question, about having a centralised advisory place for IP, IP happens in the lab and at the workbench. The real crucial part about having people like me and others there is we are capturing the IP as it happens.

The reason that we lose a lot of IP is because the scientists just do not realise that it is IP. They think it is just another really great research idea that they want to publish. If you had a centralised area where all of this happened for six different universities you would not capture that IP and it would fail.

Mr WELLINK: If I could add to that, I think the other issue is one of trust. Researchers have to be able to trust the people they are working with in commercialisation and therefore people commercialising have to be part of the body where the knowledge has been generated. Universities need to own that type of skill. As Shanny said, it is a day-to-day proposition. We have to be on tap. We have to be known to the researchers. We have to be part of the team. Having a body separate makes it much more difficult to get the trust engendered, in my experience.

The Hon. MELINDA PAVEY: Appreciating that you raised some good points about being there at the workbench and their being able to trust you, what about your having the contacts and the knowledge at that higher level to help those researchers get the venture capital? Maybe it is one step up so that there is a group of entrepreneurs working on behalf of the researchers once that IP has been identified. Because of the size of our country is there some room there for that type of thing?

Dr DYER: We are setting up an entrepreneurs club that will link in with venture capitalists. We will have a representative from the US. We will have Australian venture capitalists who they can link with, similar to what they are doing at the ATP with the BizNet Club. Four pre-seed funds have been set up to help fund very early stage high-risk ventures. They are venture capitalists who are very willing to give input and assistance to researchers. That gives you the link straight away into those avenues.

Professor BOOTH: As you say, in those areas where there might be highly specialised advice, particularly in the complex areas where we might strike that once every so often, being able to tap into that at a State-level in a consolidated way could be useful for all universities rather than reinventing the wheel every time you want to tap into very specialised advice.

CHAIR: Taking a step back from commercialisation for a moment, in the whole field of science and innovation broadly speaking what type of research is being conducted in New South Wales? What are our strengths in science and innovation?

Dr DYER: In New South Wales in general our strengths are very broad. We have very good work in medical devices. As you will know, there have been a number of very significant companies generated as a result of research done in New South Wales, but also in Victoria. It is across State boundaries. Medical devices would have to be one of our strengths. In the medical fields we have strengths in nanotechnology.

Mr WELLINK: Also in material science. Energy is another area. Peter alluded to environment. I think we do some great environmental work, particularly with water and soil remediation type work. That is very important as well.

Professor BOOTH: Software development the State is reasonably good at.

Mr WELLINK: And broadly biotechnology in all its manifestations including medical devices, which is under that heading.

The Hon. PATRICIA FORSYTHE: What role do you think government, particularly the New South Wales Government, should play in improving the mechanisms that provide the linkages to the private sector, to university and to government research sectors?

Dr DYER: Universities have their own IP and commercialisation policies but that varies between universities. So if an industry comes to us, thinks it has everything square in their head and

know how to deal with it they will go to another university and the policy will be different. That is even within New South Wales universities. Then in other States things are different. One of the things that would assist would be harmonisation of policies as well. I see us as Australia. I know that New South Wales is important but if you are linking with industry internationally they see us as Australia. So something we could do would be having policy and harmonising it.

The Hon. PATRICIA FORSYTHE: Compared with our major international competitors Australia's recent performance in private sector R and D has been considered reasonably poor. In your opinion what is the significance of this for privately funded research and publicly funded research in Australia and the drive towards commercialisation?

Dr DYER: I think that it very much hinders the movement of IP into the commercial arena. You see the success in the US, where there is very strong R and D investment by the private sector driving research. That very much links with the strength of publicly funded research and then moving that forward. At the moment we have a very low R and D spend to GDP compared with other countries. We are ranked about 20 something, below Lithuania. Actually, no, Lithuania is way up there. I am trying to think of a small country. We rank extremely poorly. But on the basis of commercial outcomes per hundred thousand dollars spent we do quite well. So if there was a bigger expenditure on R and D in the private sector we would be doing fabulously well.

The Hon. PATRICIA FORSYTHE: You referred to Alcatel. What were the factors that persuaded it to talk to your university?

Professor BOOTH: We had had a strong relationship with Alcatel at a teaching level for a number of years in our engineering faculty and so on and somewhat at a research level. So we worked hard at leveraging that up. It was also dependent on the fact that Alcatel Australia was able to leverage off the international firm and the international firm tapped into Australia to distribute its R and D and was able to position both the Australian division of the firm and the UTS to get part of that international R and D effort for Alcatel.

Dr DYER: They also recognised the ability that we had. Far and above investing elsewhere, we had the talent.

Professor BOOTH: Correct me if I am wrong but we would probably get more genuine R and D type things from more innovative smaller companies than we do from the big end of town generally in terms of real investment in research. The mid-sized firms generally do not tend to do their research in Australia. The more they can move their R and D to a more distributive model—we encourage that—the better off we will be.

Mr WELLINK: That is another important point, the fact that we do not have large companies in Australia that do research. They all report to parents offshore and that is where most of the spend is made. Therefore we have to work with the small to medium companies and we have to therefore start companies up because of market failure. That is, there is no one in the market to pick up the technology. Someone has to create a new enterprise fit for the purpose of doing whatever it is. They are important points. That makes us very different. Therefore, when one is making comparisons between the United States and Europe we have to be cognisant of the fact that the environment is very different here and the way we operate is very different. Really all the research by and large is done in the public sector.

Mr IAN COHEN: Does that not give the opportunity for good old Aussie originality?

Mr WELLINK: Absolutely. I think we are recognised for that overseas. It is an important issue. Shanny will bear this out but we have greater interest from overseas clients wanting to work with us than we do from people in Australia.

The Hon. MELINDA PAVEY: How does that work?

Mr WELLINK: I think the perception of people overseas is that we are cutting edge. We have had some great exports of people over the years. Many of our people have gone from Australia, worked overseas and made quite an impact. We are not leveraging off that fact as we might.

Dr DYER: With some of the bigger multinationals that are not using Australia.

Mr WELLINK: Absolutely.

The Hon. MELINDA PAVEY: How would we capture some of that research money, to get them to spend it here rather than in their home country?

Mr WELLINK: In a couple of ways. Tax incentives, certainly, and more effective networking at the highest level. For example, Shanny and I are going to a dinner in New York of the Australian-American Association in about a week's time. Rupert Murdoch is the patron. Douglas Daft, who is an Australian, heads up Coca-Cola. Other Aussie CEOs who have made it big in the US are going to be there. It is an opportunity for us to talk to those people and see if we can engage head office directly and not worry about working through the Australian branch. There is nothing like going to the source if you want to cut a deal, form a relationship. You have to be audacious enough to go to the top of the organisation and be comfortable talking with them.

The Hon. CHRISTINE ROBERTSON: The last Federal Labor Government, or a piece of it, gave quite substantial tax incentives for R and D. There was great difficulty getting it to the right place. Is that really an answer?

Mr WELLINK: I do not think the drivers for the tax effectiveness were right. They were not there looking for a result, that is, a product at the end. I think they were there for tax reasons only. I do not think the way those tax effective regimes worked were looking at an outcome.

The Hon. CHRISTINE ROBERTSON: The outcome was a lot of corporate bosses in a lot of nice places.

Mr WELLINK: The outcome was a bit different from what it should have been.

Mr IAN COHEN: You mentioned the effectiveness of going to the top. Where does that leave the effectiveness of the Department of State and Regional Development assistance bureau for your activities? Are you able to utilise them. Are you stepping over them thinking that it is quicker just to go to the top or are they part of the equation?

Dr DYER: I think they are very much a part of the equation. I speak highly of what DSRD have done with the limited money. They do not spend a lot of money in the area but I think that they are really targeting the right kind of programs. Where they can fit in is in assisting in some of the profiling in conjunction with Austrade but also in helping the companies develop up into developing their business plans and developing the companies to a stage where they are presentable to overseas venture capital and helping them make those connections. But they play quite a nice role at the early stages of companies.

The Hon. PATRICIA FORSYTHE: In your written submission and today you have identified the issue of indemnity insurance. It is apparently one of the impediments in this area. Why do you believe that public money should be covering the risk of commercialisation where the private sector has determined the risks to be too great?

Dr DYER: For one thing the New South Wales Government and the Federal Government put a lot of money into very high-risk research. The way that we then obtain the benefit of that high-risk research is to take it on to the next stage. If you cut it short and do not take that next step you have just wasted a lot of money up front. That has been borne out in all the studies that have been done. If they private enterprise had it in their own books they probably would take that risk. Because universities are looking at very early-stage research there is a high risk. But we have to take that risk because we want to get ahead and we want to be the smart country.

Professor BOOTH: Because of corporate collapses and other things the insurance market in Australia is very risk averse at present. In some of these very specialised areas there are just one or two players in Australia and they are taking a very risk-averse attitude. So it might not just be public

underwriting; it might be helping small bodies such as ourselves to access international insurers in this space. We have been struggling to try to contact international insurers. It is very difficult.

Mr IAN COHEN: Is it worse than the US situation?

Professor BOOTH: It is because there is such a big market there that they can have these more specialised ones. To give you one example—it is not related to commercialisation—we were thinking of launching a new program in midwifery, a bachelor of midwifery. Our students would have to do their delivery training as part of their course. I cannot get insurance for that at the moment so I will not be offering it. Our insurers refuse to cover the risk whereas at postgraduate level all the midwives we train are actually employed in the State sector and you are covering them and you can get the insurance. The health Minister is going to try to help us to access insurance for that course. In the private insurance market our underwriters just refuse to take the risk. It is that sort of thing in very specialised insurance markets where there is a very thin market, if you like, in Australia. The State could assist if not by underwriting at least by helping universities and others access international insurers and try to broker deals for us. For us to do it one-on-one is a very expensive undertaking. Sometimes you have to go to the UK to make submissions to underwriters and outlay all your business risk and processes and so on. For us to do that for a small clinical trial is not worth the effort.

Mr IAN COHEN: To what degree does infrastructure support prevent coordination through bidding wars between States and institutions over facilities or research centres? How and to what degree does this lack of coordination distort the research system?

Professor BOOTH: That is the Queensland effect. There is no doubt that the Queensland State Government support of a bunch federally funded research initiatives in the past few years has directed certain research grants and other things to Queensland.

Mr IAN COHEN: Is this Federal funding?

Professor BOOTH: They have by leveraging up enabled their universities to tap sources of funds that we cannot tap because most of the large funds require some level of industry or other money. We have to put in university money and someone else's money. Queensland did that by putting in State money. We are trying to get industry bodies together to coordinate a deal. Beattie put $5 million on the table and they get grants. We find that very frustrating.

Mr IAN COHEN: How important is basic long-term research in driving innovation? In turn, what impact, if any, has the focus on commercialisation had on long-term research?

Dr DYER: This is a very important question. Although I am head of commercialisation, I very much support people doing basic research. One of my presentations includes a jigsaw puzzle. The people doing basic research are putting the jigsaw together. Their work may not necessarily be commercialisable. It is incredibly important that we are put it together to understand how things look in the research area. Without that and without the Government supporting that very basic research, we will not have any commercialisation so we will not need this forum.

The Hon. CHRISTINE ROBERTSON: What happens to publishing, knowledge sharing and peer review? Everything has to be a secret in case it is a brilliant invention. What are we doing to research?

Dr DYER: There are two issues. One of the points I was going to include in this report but did not is that academics have a right to publish without informing the university. That is a conflict for me because the Act provides that we are required to commercialise or secure the IP that public funds are paying for. However, I do not have the right to tell them they cannot do that. I would like to have a right to review publications to ensure that we are not leaking out all of our valuable IP, and I am not allowed to.

The Hon. CHRISTINE ROBERTSON: I should think so, too.

The Hon. PATRICIA FORSYTHE: Explain the "I am not allowed to". What is the basis of that?

Dr DYER: The Australian Vice-Chancellors' Committee states that academics have the right to publish without interference. We cannot collect information about publications before they go out. We have to look at the journals to see where our researchers have published and then we record it.

The Hon. CHRISTINE ROBERTSON: You have been removing peer review and moving it to the commercial sphere.

Dr DYER: Absolutely. That does not stop them from publishing. We put down provisional patents and they can go ahead and publish.

Mr WELLINK: It comes under the heading of quality measures. We must have pristine quality procedures to ensure that we are capitalising on the intellectual property that is being generated every day.

Dr DYER: Careers are at stake. Students need publications and their thesis published. The only things recognised are their publication rate and getting their thesis out on time. Nowhere does it say that patents and interests in commercial ventures count towards their career. Academics do not want to go down the commercial path because it does not count towards their career.

The Hon. MELINDA PAVEY: Does it in America?

Dr DYER: Yes. Success is measured in America using the number of licence deals, the number of start-up companies, the number of industry-funded research ventures and so on.

CHAIR: While still acknowledging the articles published.

Mr WELLINK: It is interesting that in the United States they even celebrate failure. They learn and people give keynote addresses at Harvard based on that. It is a risk-profile issue.

Mr IAN COHEN: Who pays for that?

Mr WELLINK: The shareholders ultimately.

Professor BOOTH: We lose money in the sense that we do a lot of research that does not lead anywhere. Not all research is conclusive. A great deal of research at all universities is inconclusive or has to be repeated.

The Hon. CHRISTINE ROBERTSON: It would be an advantage to pure science to have the failures published. That would be wonderful.

Dr DYER: They do publish failures, and it is acceptable to follow that route.

Mr WELLINK: We do not do it much here.

Mr IAN COHEN: Other than the drivers of commercialisation that we have discussed and touching on the great failures, you mentioned water research. How much are the drought and the Australian conditions the great drivers? Do they give us a leading edge internationally on that issue?

Professor BOOTH: Given its climate Australia should be devoting a lot of its effort to water research. It is one of the national priority areas. That is the main driver. It has heightened interest because of drought and other things. The national policy makes it easier to get research funding and to have the research taken seriously. One hoped that would have happened years ago. Australia and New South Wales have a lot of expertise in water and plant research and so on.

Mr IAN COHEN: Does that translate to product?

Professor BOOTH: Very much so.

Dr DYER: A company was formed in Queensland, but as a result of mismanagement it fell over. The IP, which had produced salt-resistant eucalypts and timbers and measures to help reduce salt effects, went overseas. The liquidators just sold it to the highest bidder.

Mr IAN COHEN: Is there no activity in that regard here?

Dr DYER: It is lost to Australia.

The Hon. CHRISTINE ROBERTSON: Can a balance be achieved between commercial interests, IP protection and reasonable community access to the work or publicly funded research institutions?

Dr DYER: Surely. If we have something of commercial interest, we patent it. That means for a period of time it is not disclosed, but after a year it is public knowledge. Who has the right to commercialise it is important. However, unless we have the ability capture the IP, nothing will happen.

Mr WELLINK: A step before that is knowing the value.

The Hon. CHRISTINE ROBERTSON: And to whom?

Mr WELLINK: Yes. We can then take into account what the parties might be looking for in any deal.

The Hon. CHRISTINE ROBERTSON: What about the greater public good?

Professor BOOTH: It will never have public good if it is not a public product.

Dr DYER: There are very good statistics in a 2001 report showing the translation between commercialising research and the value that goes back to the country.

CHAIR: Can you locate that?

Dr DYER: I will send it to the committee. It hits the spot.

The Hon. CHRISTINE ROBERTSON: In your opinion, how successful has the cooperative research centre [CRC] program been in New South Wales?

Professor BOOTH: Do we have to answer that?

Mr WELLINK: Are we out of time?

Dr DYER: Some are good and some are bad. The main issue is the management and governance of those incorporated entities and exactly what the outcomes are supposed to be.

Mr WELLINK: One of the major issues with CRCs is when one wants to untangle something. Trying to get out of a CRC is very difficult. I have had that experience.

The Hon. CHRISTINE ROBERTSON: Are there too many players?

Mr WELLINK: Yes. There are also very complex relationships. Sometimes it is not clear who owns what. People make various claims. Many issues in the CRCs that are not going well need to be looked at very carefully.

Professor BOOTH: They are mixed is the honest answer.

The Hon. CHRISTINE ROBERTSON: Perhaps you could give the committee a good example and a bad example.

Professor BOOTH: We were involved in the CRC for cardio technologies. We made some money, which was useful. It was a reasonably good one from our perspective. However, it collapsed as a result of very complex management infighting and the money ran out.

CHAIR: It has been put to the committee that the most indicative factor of success is the extent to which industry is driving it. Is that a fair comment?

Professor BOOTH: Yes, I agree. The extent to which all partners have a genuine commitment to it and whether they have the same interest in what it is doing are important.

Mr WELLINK: Industry sees CRCs as cheap research. That is the real issue. It comes back to the value—

The Hon. PATRICIA FORSYTHE: What do universities see in CRCs?

Mr WELLINK: Access to industry is one thing and getting people off their books. I do not think that the first 50 CRCs where approached in a strategic way. My experience at the CSIRO tells me that. I remember trying to do calculations on a 70:30 scenario—that is, someone working 70 per cent of his time for the CSIRO and 30 per cent for a CRC. It became very hard to deal with.

The Hon. PATRICIA FORSYTHE: Is there a general need for long-term policy stability in government innovation programs and scientific research endeavours? How could the New South Wales Government improve coordination in this area, including the commercialisation of scientific research?

Dr DYER: Point No 1 on policies is probably our main answer. There are other ways, such as pouring in more money, but that is difficult. That is a very sensible and constructive way the Government could work.

Professor BOOTH: Some policy stability is critical. If we knew there was a genuine long-term commitment we could position ourselves appropriately and put our scarce resources where they might bear fruit. If we are not sure of the policy landscape—

The Hon. PATRICIA FORSYTHE: What opportunities might be provided by BioFirst for the commercialisation of research discoveries within these areas and New South Wales industries in general?

Dr DYER: What is BioFirst?

Mr WELLINK: I think we answered the question.

The Hon. CHRISTINE ROBERTSON: Did you say that on purpose?

Dr DYER: Yes.

Mr WELLINK: Generally, programs like BioFirst need to help set the environment. Neither the Government nor programs like BioFirst can transact what must be transacted within any area like biotech, manufacturing or anywhere else. If we had the policies, understood the program and knew the key performance indicators, we would tailor what we did to fit into that.

The Hon. PATRICIA FORSYTHE: Tell us about telecommunications with you on Bio*First*. What have they done to translate their objectives to you?

The Hon. MELINDA PAVEY: Anything?

Mr WELLINK: No, nothing that I can think of. We try to work with Bio*First* and everybody else that we can identify to work with, but by and large I do not find that government programs are able to be proactive on how they articulate and then deliver, because they are serving too many people. It is a big electorate out there, in every sense, and trying to serve everybody to satisfaction is not that easy. I understand that.

Dr DYER: There was a level of duplication in what the DSRD was doing and the other body that was being brought in to supposedly co-ordinate the work. That brought in bureaucrats who did not understand the play. I think that was a mistake. It could have worked well, but you need the right people in there. In the time available to us, I would raise a more contentious issue about BioLink and BioMed North. In our submission we ask the Government to please clarify what the position is there. I understand that those two bodies were set up, but it seemed very unclear how they were established, what their goals were and what they are trying to achieve.

Mr WELLINK: Concern about possible duplication was another issue for us.

CHAIR: How important is biotechnology to the research conducted at the UTS?

Professor BOOTH: In a sense, it is important for us particularly because we pride ourselves on doing a style of research—not our total research, but at least some of our research—that is closer to having deliverable values, whether applied in the humanities fields or science fields, or whatever. That is one of the reasons we started investing in doing commercialisation of research better. It was not because of funding drivers or anything. It would be nice if we were to discover an aspro that solved our funding woes for the rest of the millennium, but we do not really hold out great hopes for that. However we do think, given the position of the university, that we should do our transfer to commercial use much better than we have in the past.

CHAIR: If I could rephrase the question. Is biotechnology a big part of the different areas of research conducted at the UTS?

Professor BOOTH: A very big part. We have a big commitment to biotech, nanotech, water and the health sciences.

Dr DYER: And we link it to medical devices as well.

Professor BOOTH: Yes, medical devices and so on.

The Hon. CHRISTINE ROBERTSON: Then why are you not getting benefit from Bio*First*?

Mr WELLINK: I think for the reason Shanny said. Research is about managing creativity, and what we try to do is manage creativity in research and mix that with creativity in commercialisation. Therefore the people that we deal with who are in government, whether Federal or State, need to have an understanding of the creative process and what that means. Up until now, I guess I have not met too many bureaucrats who, with all due respect, can actually say, "I understand exactly what you mean, I understand the risk, but we are willing to give you a go." So I think it is an issue of managing risk, more than anything else.

CHAIR: If there are no further questions, I would thank you for the time you put into your submission, for what you have undertaken to get back to us on, and also for your valuable time here today.

(**The witnesses withdrew**)

(**The Committee adjourned at 4.06 p.m.**)