



COMMONWEALTH OF AUSTRALIA

Official Committee Hansard

**HOUSE OF
REPRESENTATIVES**

STANDING COMMITTEE ON SCIENCE AND INNOVATION

Reference: Pathways to technological innovation

THURSDAY, 4 AUGUST 2005

MELBOURNE

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HOUSE OF REPRESENTATIVES
STANDING COMMITTEE ON SCIENCE AND INNOVATION

Thursday, 4 August 2005

Members: Mr Georgiou (*Chair*), Mr Quick (*Deputy Chair*), Mr Jenkins, Dr Jensen, Miss Jackie Kelly, Mr Price, Mr Tollner, Mrs Vale and Dr Washer

Members in attendance: Mr Georgiou, Mr Jenkins, Dr Jensen and Mr Quick

Terms of reference for the inquiry:

To inquire into and report on:

Australian technological innovation and pathways to commercialisation, with particular reference to examples of successful Australian technological innovations that demonstrate strategies to overcome potential impediments and factors determining success.

To assist in its inquiry, the Committee seeks to compile a series of case studies of successful technological innovations, and the pathways to commercialisation. Submissions are sought detailing successful examples of Australian technological innovations.

Submissions are also sought with particular reference to successful innovations, on issues such as:

- pathways to commercialisation;
- intellectual property and patents;
- skills and business knowledge;
- capital and risk investment;
- business and scientific regulatory issues;
- research and market linkages;
- factors determining success; and
- strategies in other countries that may be of instruction to Australia.

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BELL, Mrs Susan, Director, La Trobe University Research and Development Park, La Trobe University

PIGRAM, Associate Professor Paul James, Associate Dean (Commercialisation and Industry), Faculty of Science, Technology and Engineering, La Trobe University

DAY, Dr Charles Robert Barnard, Managing Director, Melbourne Ventures Pty Ltd

LARKINS, Professor Francis Patrick, Deputy Vice-Chancellor (Research), University of Melbourne

CHAIR—I declare open this public hearing of the House of Representatives Standing Committee on Science and Innovation and its inquiry into pathways to technological innovation. Written submissions have been called for, and to date we have received 90. This is the fifth public hearing we have held. I welcome the representatives from La Trobe and Melbourne universities. Is there anything you wish to add to the capacity in which you are appearing?

Prof. Larkins—As Deputy Vice-Chancellor of research, I am principally responsible for research and innovation at the University of Melbourne. I am also the Professor of Chemistry and Dean of the Faculty of Land and Food Resources at the university.

Dr Day—Melbourne Ventures is the commercialisation arm of the University of Melbourne.

CHAIR—The committee does not require you to take an oath, but these are formal proceedings of the House of Representatives and they warrant the same respect as proceedings of the House. It is customary to remind witnesses that giving false or misleading evidence is a serious matter and could be regarded as a contempt of the parliament. I ask you, starting with Professor Larkins, to make a brief introductory comment. We will be treating the two universities as a group, in a sense.

Prof. Larkins—Thank you very much indeed for the opportunity to present to this inquiry. The University of Melbourne very much welcomes that. We have made a written submission and I will highlight very briefly a small number of key points. Fundamentally, what we are advancing is that, if we really do, as a nation, want to be efficient in technical innovation then we have to have the foundations to generate the knowledge in the first instance. What that means is that we need to attract and retain world-class people and we need to be investing in the kind of infrastructure that is necessary. There are many examples around the country, including the new Synchrotron that is being built here in Victoria. For us, it also starts very much in schools and universities, so we need to make that investment. It is a cooperative venture between public and private sectors.

One of the things Australia is deficient in is fostering innovation and entrepreneurship among very young people. There is an urgent need to improve the image, change the culture and support the kinds of courses that are offered. Looking at other submissions—including that of the Academy of Technological Sciences and Engineering, of which I have been a vice-president and which will make a presentation later—I think that is a very important point.

The other brief point I would like to make is that the kind of strengthening that we require for knowledge transfer and commercialisation is what is being talked about internationally as so-called third stream funding. Where there is some support for knowledge generators to transfer their knowledge it becomes very important, and that discussion in the UK is very important. One of the initiatives the university has taken is Melbourne Ventures Pty Ltd—the managing director of which is with us and will comment later.

On the second page of our submission we indicate a number of important roles that we believe government can play in overcoming some of those barriers. I would also commend, as I am sure others have, the Lambert report from the UK on business-university collaboration. We think that is a very valuable reference. Finally, Melbourne university already has quite a strong track record, and we have referred to that in our submission. The highlights are initiatives like Cochlear, Melbourne IT, Recaldent—which is now a very effective product for the preservation of teeth—and in the biotechnology area. We have elaborated on those in our submission. I would be pleased to answer questions or elaborate on some of the initiatives that we feel should be taken. In view of time constraints, I will leave my presentation there.

CHAIR—Dr Day, would you like to make some introductory comments?

Dr Day—I second everything that Frank has said from the University of Melbourne's perspective. I come from the practitioner's end of trying to make technology transfer happen. As I indicated in our submission from Melbourne Ventures, there are three key points I want to make. The first is that in technology transfer and commercialisation there is no one path that always works. I think there needs to be a recognition that there is no one conveyor belt sort of program that you could set up that would bring technologies out of universities into the commercial world. There is always going to be a diverse range of ways to do it.

The corollary of that point is that you therefore need to have people who can make the choices about what the correct pathways are to take technologies out of the universities and into the business world. In thinking about innovation and commercialisation, you need to really focus on the human element, the human capital that we have—or in fact we do not have at the moment—in this country to support that process. We actually have quite a lot of financial capital floating around looking for places to invest, so I think, if we can find the human capital to navigate those pathways, the financial capital will flow after that.

The last thing I would say is that this is a long process. Cochlear is one of the examples that Frank mentioned. The research that underpins Cochlear was done in the seventies, and 30 years later it is now a highly successful multinational company. I look at the experience in the United States where, up until 1980 when they passed the Bayh-Dole Act, the rate of transmission of technologies out of universities was sporadic and slow, as it is in Australia. In the 25 years since the passing of the Bayh-Dole Act, the level of professionalism, the rate of transfer of technologies out of the university sector, has actually increased quite dramatically, but it has taken them 20 to 25 years to get to where they are today. We can certainly accelerate it, and I think we should learn from best practice overseas, but it will take some time, so we just have to get the policy settings right and have patience.

CHAIR—Thank you. Professor Pigram, would you like to make an opening statement?

Prof. Pigram—Sue Bell will make some brief introductory remarks and I will make a couple of comments afterwards.

Mrs Bell—I am here today representing Professor Brian Stoddart, who is the Deputy Vice-Chancellor (Research) at La Trobe University. Unfortunately, he is in Canberra today for an ARC meeting. He has been charged with developing the commercialisation plan for La Trobe University. We do not have a separate commercialisation unit such as Charlie represents.

The issue that we come up with is how to fund that. Clearly, DEST funds are not appropriate for that sort of venture within a university because commercialisation and technology transfer by their very nature are speculative. We come back to what Professor Larkins has already talked about—the third stream funding. Overseas there is a clear identification with this third stream that universities are not just about teaching and research but have an important role to play in driving economic development. So there is a clear argument—and there has been much in the media lately about this third stream; I refer also to the Lambert report—that there is a clear need for funding this third stream.

The third stream is seen by many people as outreach services for university. I personally do not like that term because it has a social welfare feel to it. What we are talking about is economic development, commercialisation, technology transfer. This third stream, as has already been mentioned, has had huge impacts overseas. In our written report, I referred to Richard Lambert, who, in a recent visit to Australia, had said that last year the value of British university spin-offs floated on the stock exchange was greater than the total value of third stream funding allocated over the previous seven years. We do not have the density of population—I accept that; it is a different market here—but, if we could just get a ratio of that happening here, I think we would be doing very well. That sort of funding, with those sorts of results, albeit smaller, would provide returns to the university and to the taxpayer.

After the Bayh-Dole Act one of the things that was discussed widely in America at a recent technology transfer conference was the fact that it is not just about money for universities. We do need to have some funds to be speculative. We need to have funds to support research projects that have the ability to be commercialised whilst they are in the lab. By doing commercialisation plans early—it is almost pre-seed stuff—while they are in the lab, the researcher is occupied with developing and firming up the research. And, as Charlie has already mentioned, the practitioners need to be available to case manage, if you like, the commercialisation of that process in the early stages so that we then have a good case to go to some of the people with money. As Charlie has said, there is money around, but we have to have built up a good story by that stage. Right now, we do not have a way of resourcing the human capital to do that. I believe that third stream funding could do that.

Prof. Pigram—I would like to follow up on Sue's last point. Universities, or institutions in general, could gain a great deal of additional value from the enterprises that they spin off if the process was taken further down the pathway in house, and that is along the lines of the comments that Sue has been making. The research granting programs are not directed towards that end. For example, if you have an Australian Research Council grant, that is for high-risk research, not for technical development. The pathway to achieving something like that might be a granting scheme from government to facilitate further technical development, or almost

engineering work, in-house to provide a product, or an innovation or a cluster of products that is better ready for transferring to a spin-off or to an investor.

One of the effects of this would be to perhaps dramatically increase the return to universities by allowing them to retain stronger interests in what they are doing for longer. Better returns on the research commercialisation process to the institutions would also help lubricate the system and would make the whole system work a lot better. At the moment in Australia there are very few organisations that can actually do this. CSIRO has a reasonable capacity to take things, say, to pilot plant stage. Most universities do not. In the last 15 years the level of technical support in the physical sciences and in engineering has declined in the universities. So the flexibility in the universities to undertake this technical work has diminished over the last 10 to 15 years.

In other countries, you see closer alliances between organisations like CSIRO and universities. France is one example where the CNRS and the institutions are embedded together in the one place. The idea of allowing further technical development in house is very important. The pre-seed funds that are out there, while they are very interested in funding early stage work, in part act like venture capital funds because they have stakeholders that they have to provide a return to. Dealing with the very high-risk end of things is quite difficult.

The other point that I would like to highlight briefly as well is that in Australia often industries do not have as well developed in-house technical capabilities as they do in North America, Europe and Japan, for example. Indeed, you have seen in Australia a reduction in activity in those areas. In the mining industry, for example, BHP and Rio Tinto have dramatically decreased the level of in-house technical development activity over the last 15 years or so. Universities increasingly play an important role as a technology service provider and a partner to industry in Australia, and that is something that we do at La Trobe. We have worked as a technology service provider for around 30 companies since 1999. Again, that is assisting the commercial R&D enterprise by bolting into activities in industry itself. While that is not necessarily directly related to getting research out of universities and into industry, nevertheless it is universities acting productively to facilitate product development at the industry end. So I think that is another important pathway to be pursued.

CHAIR—Can you tell the committee how the structure of the university works with respect to commercialisation? You are the Deputy Vice-Chancellor of research. What is that top structure and how does it connect down?

Prof. Larkins—As you are well aware, universities are predominantly structured firstly around departments, centres, faculties and then, if you like, around the senior executive and administrative structures. At the University of Melbourne we have what we call the Melbourne Research and Innovation Office. This, if you like, is the gateway into the university for people who may wish to partner with the university. At any one time we have about 500 companies and up to 2,000 contracts between the University of Melbourne and various outside bodies. An investor or indeed a company wishing to engage in research has a problem and will principally come in the first instance to the Melbourne Research and Innovation Office. We have a research contracts unit and people who facilitate brokering between that and the departments. We have clear policies on intellectual property ownership and then protection. We have the capacity to file provisional patents and so on. If in fact there is a head contract then usually under that

arrangement the company will have the first rights of development of the intellectual property, so we liaise and meet milestones and so on as required.

Where you have publicly funded research like, say, the Australian Research Council and the National Health and Medical Research Council, which is clearly very critical, and where that is in a sense unencumbered intellectual property, it is owned by the university under the nature of a contractual agreement the university has with the Commonwealth funding bodies. If we make a major discovery there which is seen to be of great benefit then again we have processes to protect the intellectual property. That is really where Melbourne Ventures would come in and identify potential investors in that particular development phase.

Because of the serious gap that we are faced with, the University of Melbourne, along with the University of Queensland, established the company Uniseed, with David Miles as the chairman. We each put \$10 million into an investment fund. While there are these investment bodies, as mentioned by others, they are still fairly risk averse. Charles Day can speak some more about that. We found that, in order to get some of these VC funds to invest, we had to be prepared to put some money into protection of IP and possibly into start-up companies' further development. The real dilemma is: where do you get that money from? We sourced the money because we floated Melbourne IT and did very well out of the float. We reinvested some of that money into Uniseed. The University of Queensland, in fact, because it sold some property, took the money and effectively capitalised it.

But this is a dilemma for universities, as Susan and others are saying. We principally get the money for teaching and research. So you actually have to find an alternative source if you are going to engage in that innovation and development cycle. We do have the structures through the university, but Melbourne Ventures as well has become a very important broker for us. Melbourne Ventures therefore works very closely with Uniseed. Uniseed is very much at arms length to the university even though the university is one of the prime investors and shareholders.

So we do have quite strong structures, but I think one of the obstacles is the fact that it is not easy to know where universities—or, indeed, the CSIRO, but principally the universities—can obtain the funding to go from research to early stage development to proof of concept. As I understand it, I think that is probably a core challenge for your committee—finding out whether Australia has the balance right. I think we would all submit that that balance is not right at this point in time.

CHAIR—What is your funding? Is \$10 million essentially what you would like the government to put in?

Prof. Larkins—There are two areas that have attracted me internationally. Not every university is large enough to maintain a technology licensing office and a technology transfer office, but the larger universities overseas have their own, and smaller universities are often part of a consortium to do that.

I am very impressed with what has happened in Japan with this so-called third stream funding—which is for knowledge transfer: it is not all about private enterprises making money; there is also a high level of public good; there is knowledge that should flow out of universities

into the community. Something that has happened in other countries is that money has been made available to employ investment managers to do work at the interface. How do our universities do that? Effectively, we have to cross-subsidise it out of our teaching research funds at present. Overseas there has been money made available for that.

There has also been money made available in other countries for early stage protection of intellectual property. Filing patents, using patent attorneys and so on, is quite expensive. Again, you have to find a source of money, or else you can sell off the intellectual property far too cheaply—not hold it long enough. Paul was making this point. If you can hold the intellectual property longer, to demonstrate proof of concept, it is clearly more valuable. Public bodies have, after all, funded their research through NHMRC and the AIC and so on, and Japan, for example, has a situation where the government will pay 50 per cent of the cost of the patents filed in Japan because they want more of the money to be transferred.

The other area is the educational one that I mentioned—improving the capacity of people to be good entrepreneurs. For that, you need a mentor program and appropriate courses at the postgraduate level. Third stream funding in the UK has been used for that purpose. One example I am very familiar with is at the University of Oxford. Through the Said Business School of Oxford they run courses specifically for scientists and technologists. You actually have to have a postgraduate science, technology or engineering qualification. Then they run a series of short courses—on how to be an entrepreneur, really, and on how to protect intellectual property and so on. Again, they are not always award courses, but the question for our universities is, ‘Where would we get the money from now for that kind of course?’

So, looking at third stream funding, in my terms I suppose there are three key areas in which one would see great value. The first is supporting technology transfer offices. The next is effectively assisting with IP protection. That might be a fund—and you would have to be careful about it: you do not want it open ended, but you could clearly lay down some criteria. Thirdly, I think we need some courses that help to lift the skills of people who have a good science and technology base but really do not have entrepreneurial skills.

CHAIR—You distinguish between the generation of money for speculative purposes and knowledge generation and transmission. Shouldn’t these courses for entrepreneurs be part of the autonomous activity of the university, as part of its teaching function?

Mrs Bell—There are many entrepreneurial courses around. But, for instance, when you see the weight of a science degree at the moment, for us just to bolt on another course would not be effective. I think we need to be able to fund a review of the way we teach these things so that we can include these entrepreneurial activities. All of the courses at the moment—and Melbourne is involved with the AIC—are doing entrepreneurial courses and bootstrapping camps and things like this for entrepreneurs. But, as Frank has just mentioned, they are not necessarily award courses. For a lot of people they do not have the impact, if you like.

What I would like to see is all of our courses having this sort of entrepreneurial training in them just as a matter of course. But at the moment to change courses and add them is a huge disruption to any university and it is costly because of the resources that need to go into it. Once we have them all set it will be just like now—the courses will run and it will happen. People will take it for granted that it happens. But right now there is this little gap. All of the universities run

business planning courses and things like that to get students that additional experience. But who runs the business planning courses? At our university it is my park that runs it. It is not part of our profile. We do it as an extra because we see the value in it, but, again, it is really hard to justify those costs constantly.

Mr QUICK—But if you set up something as radical as a university of technology park where you brought research and industry together, perhaps that might be a better avenue.

Mrs Bell—Yes. We do have a research park. I am the director of the research and development park. A typical university park comprises many pieces. In our park we have a business incubator, which is heavily subsidised by the university at low rent, for start-ups et cetera and all of the services. No incubators, even mainstream incubators, if run properly are ever going to make a profit for anyone. You have to have a way of subsidising it. An incubator embedded in a university tech park is the ideal situation because then you have the development of the park to subsidise those activities. The problem is that, if you have your land lease income subsidising that as well, you still have to find additional funding for the teaching. The people in parks and tech transfer offices are not necessarily teaching staff. We are the practitioners. I think Charlie used that term. We teach people to put a business plan together and help them through the process, but we are not in a position to do the formal courses.

Mr QUICK—But is the problem that every university is going to develop their own technology park?

Mrs Bell—No, not everybody has the space to do that.

Mr QUICK—But does the overseas experience say that, if you set up a fair sized technology park where each of the universities could perhaps rent some space, you could have a huge incubator rather than each of you trying to find your own space and the like? There would be a monumental mind shift. Would that work far more effectively than Monash, Melbourne, UTAS and the whole lot of them trying to do it? There are not the funds to set them up properly.

Prof. Larkins—Certainly at Melbourne we have not gone down the track of saying that we want to create a technology park. Firstly, we do not have the space. Secondly, we have looked for partners. I think the point about the entrepreneurship is that it is also a matter of timing in the educational cycle. Undergraduate students are not at the right level. They are not receptive. You actually need people who are out there creating knowledge or wanting to use knowledge and who are saying, ‘How do we better focus it on taking raw knowledge and transferring it into products and wealth?’ There is a limited capacity, I think, in this country to sustain a technology park. So I think you are absolutely right that, if every university—and there are 37 or 38 universities—suddenly said, ‘We must have a technology park,’ that would not be right. You could debate, depending on the size of the state, whether you could sustain one or two, but I suspect you could not sustain more than that.

In terms of incubating those activities, consolidation and partnership make sense. The things that I am talking about are really the courses where you have got postgraduate research students, where you have got staff who, at some point in their career, find that they are making discoveries that may have the potential for significant wealth generation for Australia. At that point, the

people are actually receptive to this knowledge. That is when you need to deliver the courses. Indeed, people in companies, as well, would benefit from this kind of activity.

CHAIR—I would like to stay on this point. I am not really talking about the money. My difficulty is that you have identified a key problem in terms of universities—which is the transmission of knowledge about entrepreneurship. Yet, at the same time—Mrs Bell is quite adamant—you do not see that as part of the normal functioning of a university but as something distinct and requiring additional funding or separate funding. That might be part of the problem. Your perception of this as not being routine and something to be taken for granted may indicate something about what the cultural issues are. I do not mind universities gouging more money out of the government; that is fine. I am saying that the way in which this is being thought about indicates that there is a predisposition on the part of the very people who want to drive the process to treat it as being outside the normal ambit.

Mrs Bell—All we are doing is reflecting what is happening worldwide. We accept there are three streams to a university's philosophy, and one of them is economic development. But at the moment, we do not get funded for that. We accept it. We do it. Here in Victoria, all the commercialisation institutes at universities and CSIRO—everybody—have come together to form the Melbourne commercialisation professionals network, because we see some of the things you were talking about, Charlie: the need to collaborate. We all have different things. I have a tech park; Charlie does not. Charlie has resources that I do not have. It makes sense to collaborate. But that in itself does not solve the problem. Wearing another hat, I am the president of Technology Parks and Incubators Australia. Again, we see that need to collaborate.

Here in Victoria—in fact this evening—there is a discussion about the collaboration of parks here in Victoria. Even with the university parks that are here, we all do something slightly different. So we are not actually in competition. What we are looking at is a marketing plan overseas that says, 'Come to Victoria. Whatever you need we've got.' We are very open to collaboration. We are already doing it. Melbourne has got Melbourne Ventures set up. For a university like ourselves, yes we do see it as core to our justification for being here. But right now, if we were to take some DEST funds and use them in any sort of speculative project, we would not be looked too kindly on. If we took resources from one of the faculties to set up a commercialisation arm, I am sure Paul and his colleagues in science would have something to say about that. We have always got this dilemma of balancing those funds. As Frank has said, what we are seeing overseas seems to be a really good solution to this.

CHAIR—Professor Larkins, would you like to add anything?

Prof. Larkins—You are right: this is not just about money. I really do think, as I said in the introduction, we have to make a cultural shift, and we are seeing it occur. There is a negative image about entrepreneurs in Australia. The label 'entrepreneur' is linked to some of the bad cases, which you are all aware of, and that is a problem for us. Overseas, entrepreneurs are celebrated as being people of great drive and so on. It is not a very nice word in Australia, in a way, and yet what lies behind it is very critical. Charlie, this is a core area for you, I think.

Dr Day—Yes. If I understand your point correctly, you are saying that, on the one hand, we are sitting here saying, 'Education of entrepreneurs is a critical thing,' and you are saying, 'That is a core business for universities; why don't you get on and do it'—to paraphrase your question.

My view is that, if you look around, the universities are actually doing it. Sue and her team are running courses for people at La Trobe. We at Melbourne are running courses, Melbourne University Private has created courses in conjunction with the Australian Institute for Commercialisation. Melbourne Business School has recently launched a course in innovation and entrepreneurship. Monash takes its PhD students away for a boot camp. There is a lot of activity going on, but the issue is: how quickly will that get us to a point where we have a cadre of well-educated people who understand the entrepreneurship program? I think what we are arguing is that there is actually a role for that to be kick-started or pump primed, if you like, to make it happen more quickly than it would otherwise happen.

Coming back to what I said about the US experience and the fact that they have had 25 years working at this, we are saying that if you want to wait 25 years, leave it to the universities to try to do it organically. But if you want to see it happen sooner, there is probably some work to be done in pump priming that process.

Mr QUICK—How would you suggest we do that? You would not do it through the NHMRC, where you have got to justify your existence and the like. How do we learn from overseas if we do pump prime it and suddenly whack in \$150 million and then there is a mad scramble by the 37 or 38 universities who all reckon they have got the best thing since sliced bread? How would you suggest we do it?

Dr Day—As Frank has pointed out, some of the role models overseas are already quite strong. The UK example of third stream funding is important. The role of the tech transfer officers or the commercialisation officers of each of the universities as leaders in that education process is not to be underestimated, and so making more funding available to build capacity in those offices is critical. I get academics coming through my door regularly saying, ‘Can you please run a seminar for our department on commercialisation?’ I have limited capacity to do that. If I had more capacity to do that, I could do it on a more sustained and more proactive basis, and I am sure Sue probably has a similar experience.

I think that if you lead through supporting the technology transfer officers who can drive that more rapidly, you will see it. As that market develops you will see more independent providers, like the Australian Institute of Commercialisation, come in and also pick up the process.

Prof. Larkins—I was going to try to answer Harry’s question. I would not do it through education and science. The impressive thing about the UK example is that it was Gordon Brown, as the Chancellor of the Exchequer—effectively the treasurer—who initiated the Lambert report, and basically said, ‘Wealth generation in Britain is dependent upon us being a rich country of new ideas, capturing those new ideas and getting them into the marketplace. In Australia it needs to be driven through an industry portfolio, or even a treasury or finance portfolio. It has got to be put right up there as important. I would have the involvement of the Chief Scientist, and you have got the Prime Minister’s Science, Engineering and Innovation Council. You would in fact make it as a national entity. It is not just universities, either. I would structure it and be very strategic about it.

I do not want to go too far down that track, but you would have to have a strong view about what was appropriate in each state and make the investment—maybe in partnership and engagement with state governments and so on. Fundamentally, one would be sending a very

strong signal that this is really important for the country. To me, that is why it is not just about money. One can often get hung up on the money, but it is actually sending the signal.

The striking thing in the UK and in Japan and so on is that they are saying: 'This is not just about teaching and research; it is also about having to do better at knowledge transfer and capturing the knowledge et cetera.' So you have to put it up in lights along with the other ones. That is fundamental. I would approach it quite differently. I just would not embed it in education and science, because it is more important than that. It is a national economy driver and that is where you want to put it up—appropriately.

Dr JENSEN—I would like to throw in a few thoughts which might differ from the way in which you think about it, and I would appreciate your comments. The first comment we had was that Australia is not very good at entrepreneurship. I would argue that in fact Australia is very good at it. If you have a look at the number of small businesses and so on that we have, you see they are very good at it, but we are not good at doing it in the scientific area or in the engineering area.

The other point that I would argue here relates to Professor Larkins's comment that teaching of these entrepreneurial skills is not really appropriate at an undergraduate level—that you need to take it further on. I slightly take issue with that because there are a number of students who never go on to do postgraduate research, yet they might go into areas in industry where having entrepreneurial skill is something that is essential anyway. Furthermore, when you tack it on at the postgraduate level, it is not something that will be inherent in the thinking of the people concerned. When you finish a science degree and go on to research and so on, the scientific thought process has become inherent, because you have been trained right through for it. If you tack the teaching of entrepreneurial skills on later, it is foreign to people—even those at the research aspect—so it will require an act of will for them to think in those terms rather than that being an inherent part of the scientific process: 'I am doing the science and along the way I will do this.' This is something that I think Mrs Bell was saying—about commercialisation being thought of during the research. I would argue that, if entrepreneurial skills are taught very late in the piece, it will not be natural for people doing research to be thinking in those terms.

Prof. Pigram—I would like to make a couple of comments about that. At the undergraduate level I think industry awareness and industry engagement in broad terms are extremely productive. La Trobe, for example, has an industry cadetship program, which is voluntary and competitive, through which students can go out over the summer and work with industry. The best science students take that up, and it is an exceptionally productive process.

If you are talking about innovation in science, then perhaps some remarks about university culture and some of the difficulties in science might be helpful. As a PhD student you do not get your PhD unless you extend knowledge in your area. You are working day and night against the best people in the world to push that frontier, and if you do not push that frontier you have not succeeded. You have to publish a certain number of international journal papers. So, to succeed as a PhD student, you have to be pushing that boundary.

The researchers and the academic staff who are working alongside those people experience the same extreme tension. If you are not successful, if you are not challenging the best people around the world in your particular research areas, you are not going to get that next ARC

grant—three out of four fail. There are a lot of good proposals out there. As a researcher you have an absolute drive—you have to be the best and you have to make things happen. At that particular point, awareness of industry and progressive industry engagement from the undergraduate level through, if you are taking a science pathway, is very important. As a PhD student you can do short courses on IP and on commercialisation, and you can work with your supervisor and progressively engage with industry. If you expect someone who is taking a science-research pathway to be an entrepreneur as well at the beginning, it introduces another real tension into that. They will grow into that role.

As a researcher going down the research pathway, I would like someone walking alongside me giving productive, practical advice and assistance—from a tech transfer office or something like that—to keep me on the right path, so that when I get to the end of my resources I can say: ‘Help. Please pursue.’ I think that that does provide some insight into the tensions in university culture that we were talking about earlier. Succeeding in science is extremely difficult. Having good people out there in industry who do understand the entrepreneurship process is very important. Again, university engagement with industry and industry engagement with university really helps to facilitate that and, particularly, to break down the barriers and the mistrust on both sides. That is also an important thing that can be done.

Dr JENSEN—I understand what you are saying. The point that I am coming back to is that if you have the students learning these entrepreneurial skills at an undergraduate level it is going to be inherent in their thinking process. Yes, the excellent science will be there, because they are the best students, who have chosen to follow a research career, but if they have had a lot of this entrepreneurial skills teaching in undergraduate years then they have some idea of what is involved: ‘I’ve got this good idea, I’ve done the research on it and it works. How do I actually go about getting this to commercialisation?’ I think it is a foreign concept to a lot of scientists.

Prof. Pigram—In the context of an undergraduate program, there is also the issue of fitting it in. In a science program you would work towards two majors at third year. In my area, which is physics, you would be looking at physics and mathematics or physics and chemistry or something like that.

Dr JENSEN—I have the same background.

Prof. Pigram—If you bolt in entrepreneurship then you are going to be starting to take things out of a three-year program. So perhaps the pathway is to do it as a double-degree program with a little more space and time to do those sorts of things. The University of Technology, Sydney does have a nanotechnology entrepreneurship double-degree program which seeks to address some of those sorts of things.

Prof. Larkins—I was just going to clear up the point that, in education, timing is very important to having an impact. Many of us have tried to put some awareness of entrepreneurial activity into undergraduate curriculums. By and large, the majority of students are not very receptive to that. At the postgraduate level, the perspectives really do change. People are suddenly creating knowledge, and this comes back to your very point: ‘I’m creating this knowledge. It might be worth something—maybe we should protect it. How do I go about that? What is the patent process?’ One of the things we do with our postgraduate students is say, ‘Look, you might create something which is of value and therefore you have to manage your

workbooks in a particular way. You have to document it, you have to date it every day and you have to sign it.'

We have had to be engaged in patent defences. We had a classic case in the US where we won a challenge against a major patent of the university because we could show that our workbooks were signed one day before those of someone else somewhere else in the world. When a postgraduate student comes in and is in a lab where they may be subject to a research contract or whatever, we do have those induction processes and the students are receptive to those, because that is now part of their enterprise. At an undergraduate level that is very abstract and it is not well absorbed. As I say, equally, you find that when your academic staff are suddenly getting asked about these things they realise they have a gap in their skills, so they are very receptive to absorbing the knowledge. So we are not opposed to this teaching being done at the undergraduate stage. It is a question of relative impact. That is really what I am saying. Certainly our educational experience is that people learn particular skills best when they feel they need them.

Mr QUICK—In your earlier remarks you mentioned fostering entrepreneurship with young people and investing in our schools, and one of the problems we face is trying to get decent maths and science teachers in our high schools—and even down to our primary schools. So if these sorts of concepts are seeded even down in that area you are getting a whole new cultural mind-set coming through that perhaps the universities will be more responsive to in the next 10 or 15 years. To me, as an ex-teacher and an ex-principal, investing in schools to ensure that every child has the best maths and science teachers in primary and then secondary is vital for the whole process.

Prof. Larkins—I agree absolutely. So it is a matter of degrees. I am not actually saying you should not make people aware of entrepreneurialism and knowledge creation and wealth creation and public good and all that at any stage. Indeed, you must and you should, and we do. It is a question of where do the major drivers come from? It is at the higher levels, and that is where you need the additional skills. But you are absolutely right. Many other inquiries and so on have looked at this question. We should start in primary schools and make people aware of it and give them a fundamental understanding of it, because we live in such an important technological age where everybody is using technology. The Australian Academy of Science, of which I am a fellow, has done a tremendous amount. For example, it has been working with science teachers and so on and trying to pursue precisely that point. You are absolutely right, but it is a matter of degrees and it is a continuum; it is all the way through.

CHAIR—Dr Day, can you tell us briefly how Melbourne Ventures works?

Dr Day—Melbourne Ventures is a subsidiary of the university. Our role is to provide advisory support services to academics who are seeking to commercialise their technology. Our starting point is usually where an academic, as a result of a research program funded by various sources, usually government, will come to us, or we will approach them if they have an attractive idea. We will help them work through the process of commercialising that, so that—

CHAIR—Can I stop you there? What happens? I am scientist who happens to have an attractive idea—or Dr Jensen, more likely. How do you find him? How does it work?

Dr Day—Either he finds us, because we make our name known around the campus and he comes and talks to us, or we find him through talking to his colleagues. We attend a lot of the seminars around the university to be aware of what is going on, and we might hear that Dr Jensen has a particularly attractive idea that we should be talking to him about. We will have a meeting with him and try to understand the dimensions of the technology.

CHAIR—And?

Dr Day—From that initial meeting, we sit down and we have a process that we go through that examines the technology. I think there are eight dimensions, including such things as the intellectual property, the potential business model, the market size, the competitive intensity, the people involved and so on and so forth. As we go through that process, we form a view on the attractiveness of the technology and also what the right path to commercialisation might be. It might be through licensing and, if so, who might be potential licence candidates, or it might be through a start-up and, if so, who might be appropriate investors to approach. Having identified that, it is really a process of iteration, I guess. As you learn more, you discover more about what you do not know and so you go and chase that down. When it is ready for presentation to a licensee or an investor, we go out and we sit next to the inventor and across the table from an industry player or an investor and say: ‘What do you think? Are you interested?’

CHAIR—Are you any good at it? Does it work?

Dr Day—Yes, I think we are actually pretty good at it. I get a lot of feedback from academics around the University of Melbourne who say: ‘Thank God you’re here, because I didn’t know how patents worked. I didn’t know which industry player to go to.’ My team spend a lot of time cultivating links around Australia in the various industry sectors that we are active in. Last week one of my team took one of our leading scientists up to Sydney to talk to two industry players in the nanotechnology space, and we are hopeful that there will be some activity as a result of that. We certainly have successfully attracted significant venture capital into Melbourne in the last few years. We have a very full pipeline at the moment, so I think we are pretty good at it.

CHAIR—And this is what La Trobe would like?

Mrs Bell—This is what we would like to do. We have got the resource of the park and we also have the advantage of learning from people like Charlie, but at the moment I do not have a team. It is up to me to get into all of the faculties, with the exception of science—that is where Paul and I work together; he can help me there. There is a lot more that we could be doing, but it is a question of resources.

Mr QUICK—So, regarding the British third stream funding, how much in pounds sterling are we talking about?

Prof. Larkins—About £100 million a year for five years, and it is invested in a spectrum of things with clearly expected outcomes—which is perfectly reasonable because it is targeted, strategic money. It is driven by the equivalent of our Treasurer, actually—by Gordon Brown—and it is all about improving Britain’s international competitive position. The problem is—and it is in the Lambert report—that increasingly companies are not doing the early stage research in house. If you think about it, how many companies in this country now have major research labs?

The fact is they do not have the research labs. The new ideas around the world are being generated now predominantly within a publicly funded environment, and therefore it is becoming increasingly important for countries to get out to their companies the knowledge which is coming from the public sector. That is why your review is so timely. One of the things that has happened is, not on a weekly basis but on a monthly basis, we get international companies sweeping through Melbourne cherry picking; they just come through. They have people literally roaming the world looking for new ideas relevant to their industries.

So that is the way the world has changed: knowledge generation and new ideas, worldwide, are predominantly coming out of the public sector. And what Gordon Brown in the UK is saying is, 'Hell, too much of this is going offshore. We have to get better at protecting it here in the UK.' And so he has put up this £100 million a year for five years and he is supporting technology offices, talking training, helping people to protect patents and generally brokering, because the companies are just not doing it in house, but of course they need it to drive the industry. So there is this big cultural shift in the way in which research knowledge is being captured worldwide and we need to amend our model here in Australia. That would be my message on that.

CHAIR—Could you explain point six in your submission about making it easier to do business with governments, particularly with respect to legal agreements? It seems sensible, because people say, 'What does it actually mean?'

Prof. Larkins—Perhaps the most difficult case at the moment is the Cooperative Research Centre—and I realise my colleagues are behind it here. The legal agreements, instead of being three to five pages, are more like 30 to 50 pages these days, in terms of contractual obligations and negotiations. We think there ought to be more standardisation: surely we can get down to relatively simple contracts that we do not have to negotiate on a case-by-case basis.

The worst case at the moment undoubtedly is the Cooperative Research Centres in this new round and the agreement between the Commonwealth and the participants. My colleagues probably should develop that; I should not go too far down that track. But it is not good practice to be difficult. So what we are really saying is, if we have the national interest at heart and it is publicly funded, surely we can have relatively straightforward, simple contractual obligations. The University of Melbourne deals with the Commonwealth all the time, for example—ARC, NHMRC and so on. Why can't we have a generic contract about the way we have to behave about protecting intellectual property and so on? As particular projects came up we could have schedules which we could attach. But every time we have to go back to all of the indemnity clauses, all the intellectual property clauses and so on, and really it is very time consuming and it is becoming very expensive. We have become a very risk averse nation—and each time you deal with a different group of lawyers. That is the trouble. I am sure you have had this. It would be better if it were just one set. And the present Cooperative Research Centre arrangements for universities is really fundamentally untenable.

CHAIR—Is there any way in which you can roughly quantify how significant a problem this is? Because this is one that should be resolved so long as it is really solvable.

Prof. Larkins—Your colleague Minister Nelson has amended it. The original arrangement between the Commonwealth and the participants for the CRC caused all the universities to say,

'If you insist upon these clauses, no university in the country will be a member of any CRC.' We had to go that far to get across to Brendan that this was serious. It had of course all come out of Attorney-General's. When he finally focused on it, he agreed, but we had spent months and months—lots of lawyer time et cetera—on it. Now we have changes there, but we deal with the Commonwealth on a range of programs every month and we seem to start from scratch each time. Different departments, whether they be industry, science or the environment, have their own forms and so on. Why couldn't they be standard—just in terms of working in the national interest? That is really what is behind this—there are a range of examples where we think you could streamline these things.

CHAIR—Would anybody like to pick up any points that they wish they had addressed but did not get an opportunity to?

Mrs Bell—We were talking about third stream funding. This was wonderfully illustrated for me at the tech transfer conference in Arizona earlier this year. I was a couple of minutes late leaving one session to go to the next session, entitled 'We teach, we research, now you want us to do what?', and I could not get into the room. I think everybody is facing these issues, and what Charlie and I are talking about is that, by supporting tech transfer officers, we can go in and support those researchers. Once we identify an idea, we can case manage them. We can start the process of putting a business case together and ease that process. With early education they will be more open to that, but right now we have a lot of people who do not have that. We really need to do some intense work with them, and that needs resources.

Dr Day—Picking up on what Sue is saying, one thing that I want to see coming out of this is a recognition that entrepreneurship in technologically intensive industries is different to entrepreneurship in the broader community because it requires some pretty specialised skills and has some pretty complex business building challenges. So I am a little less worried than Frank about the crisis of entrepreneurship in Australia, because when I go to the market I see Boost Juice doing pretty well and I say, 'There are entrepreneurs alive and well.' When I look at the price of my shares in Macquarie Bank I say, 'There's a pretty innovative company that's being quite entrepreneurial and doing quite well.' I do not think there is anything inherent in Australian culture or business that means that we are not entrepreneurial, but I do think that the process of being entrepreneurial in technology intensive businesses is more difficult because you have intellectual property issues, extraordinarily high technological risk and very long time frames. In that respect, I think that Australia needs to focus on getting, if I can be a little immodest, more people like Sue and me to help the technology people to tackle those challenges. That is where I think some of the shortages are at the moment.

CHAIR—Thank you very much. Once again, thank you for coming.

[10.19 am]

VAUGHAN, Dr Geoffrey Norman, Chairman, Cooperative Research Centres Committee

CHAIR—Welcome. I invite you to make an opening statement before we go to questions.

Dr Vaughan—I am now the retiring chair of the Cooperative Research Centres Committee—I will be handing over my baton at the meeting of the CRC Committee next week—but I certainly put in my submission as Chairman of the CRC Committee. I noted in the submission that, because of your deadline, I had to do it as chairman. It was to be considered by the committee at its June meeting, but the June meeting was deferred until next week, so they will be considering this paper at next week's meeting. It may be that they will put in some supplementary comments, but I would not be able to guess at that, having handed over the baton.

CHAIR—You sound halfway relieved!

Dr Vaughan—No. Anyway, I have a continuing interest because I am also a member of the IR&D board, so pathways to commercialisation are certainly of great interest to me. As far as the CRC Committee is concerned, my submission outlines the CRC program, which should be known to you fairly well. The program commenced in 1990. There have been nine selection rounds and 158 successful applications. When a CRC starts it is given seven years of funding. Some centres can be renewed and they get 13 years of funding. They can then be renewed again and get 19 years of funding. So there is certainly long-term funding for cooperative research. At any given time about 60 centres are operating. With the 158 successful applications, and because of the fact that there are renewals, there have been, in all, something in the order of 99 actual centres.

The centres are made up of universities, the CSIRO, state and federal government research organisations, research institutes, industry and peak organisations—various combinations of these make up the package, and it is called cooperative research because it brings those people together. The sectors covered by CRCs are manufacturing, mining, information technology, agriculture, the environment and medicine. Most of those have a commercial atmosphere and a commercial drive, so pathways to commercialisation and CRCs go hand in hand. The CRC Committee itself, which gives advice to the minister on all aspects of the program, has been heavily involved in commercialisation interests and activity. Included as an attachment to my paper are the agenda items of the committee when commercialisation activities have been considered by the committee in recent times.

The objectives of the program have changed from having a somewhat equal emphasis on commercialisation and public good outcomes to being very much commercially driven and heading towards commercialisation and economic growth. The objectives of the program have changed in time to head in that direction. The success of the program in pathways to commercialisation is, I believe, very heavily related to the governance of the program—the governance of centres. The centres operate under a skills based board, which must have a majority of research users mixed with a minority of research providers. It is those research users who very much drive the commercialisation aspects of a CRC. Not only the board but also the

users themselves participate in the advisory committees to CRCs, such as commercialisation committees, research advisory committees et cetera.

Every centre must have a commercialisation plan. That plan covers not only the aspects of the centre as a whole but also the commercialisation of individual projects. The plan obviously covers such things as patents, licences, technology transfer dollars, royalties, sale of IP and the development of spin-off companies and start-up companies. All of those aspects have been covered, one way or another, successfully within CRCs. The other issue is commercial skills—not only through the board, the committees and the involvement of users, but also in training programs.

The previous discussion centred on some aspects of training programs. The training programs within CRCs have been directed towards their postgraduate students. They have specialist programs, boot camps et cetera which cover commercialisation and intellectual property. The postgraduate students very often have an industry mentor and an industry placement as part of their total package so that they are ‘industry ready’ when they come out. That label has been put on them by industry, not by me or by the CRC program itself. My submission outlines in dot points some success stories coming from the CRC program. You can see from those dot points that there has been a drive towards commercialisation—successful commercialisation—coming from the program itself.

I will finish by saying that I believe cooperative research is a very successful mechanism and pathway to commercialisation. That is not only shown through the CRC Program but has been picked up by the ARC to develop ARC Linkage grants. Also, the NHMRC has cooperative grants; the CSIRO flagship program has a combination of industry and CSIRO divisions; and the commercial ready programs of the IR&D Board have collaborative grants within the range of grants. Some of the specialisation grants within the IR&D board—the Pharmaceuticals Partnerships Program, the automotive industry innovation program—all depend on cooperative research. I think a lot of that cooperative research has come from the great success of the CRC Program. I will leave it at that, and we will go on to the discussion.

CHAIR—Thank you very much, Dr Vaughan. Could you just briefly spell out what the expression ‘and to advise the minister on the outcomes of selection rounds’ actually means in your description of the work of the committee?

Dr Vaughan—The CRC Program operates presently under the Department of Education, Science and Training. Some time ago it was under the Department of Industry, Tourism and Resources and prior to that under the Department of the Prime Minister and Cabinet, so it has been in various departments, but it is presently in DEST. The CRC Committee gives advice to the minister, Brendan Nelson, on aspects of the program. The selection rounds are the heart of the program. They are competitive rounds held every two years against the funds available. There are something like 15 to 20 centres established each year. The CRC Committee advises the minister which are the most competitive grants, the most successful applicants. The minister takes that advice and then determines the outcome. The CRC Committee itself does not select the actual centres—

CHAIR—It identifies them.

Dr Vaughan—it gives advice to the minister. Obviously, the minister very often accepts it—I have not known a case where he has not accepted the advice of the committee—and announces the grants accordingly.

CHAIR—Just briefly, what role does the department play in that process?

Dr Vaughan—It services the selection program. The CRC Committee itself is an independent committee with people with specialist skills across all aspects of the innovation pipeline, as it were—people with expertise in research, development, innovation and commercialisation. The 12 people on the committee cannot do it on their own. They rely heavily on expert advisory panels. There are four panels that look at the applications, depending on whether they are from manufacturing, IT, agriculture, environment, medicine et cetera. It is those expert panels that give advice to the CRC Committee. The CRC Committee takes that advice—and uses its own appreciation and application—in making the recommendation to the minister. I and others of the CRC Committee also attend meetings of the panels as observers to get a feel for and an idea of how the selection process is going. DEST itself services the committee, provides all of the secretarial support and all of the arrangements with regard to interviews, travel, meetings, agendas et cetera.

CHAIR—Is there a formula for the constitution of the panels? Is that specified or is it ad hoc?

Dr Vaughan—It is ad hoc. The panels are reviewed in each selection round. For a while there were only two panels. One panel was looking after manufacturing and IT; the other panel was looking after medicine, agriculture and environment—effectively a physical sciences panel and a life sciences panel. Following a review at the last selection round, four panels were established. One looked after manufacturing and IT, another looked after mining, another looked after agriculture and environment and another looked after medicine.

CHAIR—Who selects the panel members?

Dr Vaughan—The CRC Committee.

CHAIR—There were some observations made on the complexity of the contracts. Do you have any observations of your own?

Dr Vaughan—The CRC Committee itself does not get into the operational area of the program; that is left to DEST. The issue of contracts is an issue that DEST must respond to. Cathy McKay, who is one of the senior managers of the CRC Program from DEST, is here as an observer today. I am certain that Cathy will see that in the DEST presentation—and they will be meeting with the committee shortly—that aspect will be covered. But let me say as an observer from the CRC Committee that the universities are not the only people signing the contract. The contract obviously has to be wide enough to incorporate all of the members of a CRC. The universities say they want a simple issue and that they can deal very easily with a simple issue. That may not be the case when dealing with other Commonwealth departments or industry, research organisations, peak organisations et cetera. The contract has to be able to meet all of the interests of all of those people and the Commonwealth's interest, because they obviously want accountability. But, having said that, I will leave all that to when you meet with DEST.

CHAIR—You seem unsympathetic towards their view.

Dr Vaughan—No, I am not. I must admit I would like to see the process as simple as possible. As has already been stated, once solicitors get into the act things become a little more complicated than the man in the street would see. I think that may be an issue that has come up through the program. But you need a decent contract because it is long-term funding—seven years—and the Commonwealth obviously wants accountability across that period. A lot of public money has gone into the CRC program and there certainly has to be accountability. But it has to be with the least stress to the participants and as efficient as possible. There is no question of that in my mind. Hopefully, that is where it can head.

Mr QUICK—The commercialisation plans have evolved since the CRCs have been set up.

Dr Vaughan—Yes.

Mr QUICK—Are there any gaps or limitations? You have mentioned the various areas that CRCs are set up in—do they have the same sort of general commercialisation plans or are they industry specific? How have they evolved?

Dr Vaughan—The commercial plans have to be put in to DEST so that they can look at them to see that they are covering the correct areas. But the various CRCs are quite unique. They are different from another. That is why they have been left under the governance of an individual board. The CRC committee does not run the centres. The department does not run the centres. It is left to a board to run a given centre. That board takes on the responsibility of having to produce a commercial plan. That plan could be different depending on whether you have an agricultural CRC or a mining CRC, for example. The commercial plans will differ accordingly. But I am very confident that through the activities of the boards and the efforts that they put in they develop appropriate plans for the sector and area of activity that they are operating under.

Mr QUICK—Are there any industry-specific gaps or limitations?

Dr Vaughan—I have not seen them. I think they have been very successful in driving commercialisation within CRCs. Obviously, as I mentioned, the commercial plan of a farming or agricultural CRC will have activities at the farm gate, as compared to a mining CRC, where the commercialisation plan will be centred on the activities of multinational companies. Obviously they have to be different. There is a whole spectrum of activities and a whole spectrum of plans developed for the centres' special areas of interest.

Mr QUICK—So when there is an assessment—when one CRC is competing against another for establishment—those specific differences are taken into account?

Dr Vaughan—Yes. The commercial activity is proposed in the commercial plan as part of the application process, and that is run on a competitive basis. If there are two applicants in the same sector and, all things being equal, one appears to have a better commercial plan than the other, then it will win through on that.

Mr QUICK—The phrase 'national interest' was mentioned a few times by previous witnesses. Is that ever considered in the setting up of CRCs?

Dr Vaughan—Sure. One of the areas of evaluation of CRCs in the application process is to see how they fit in against the national research priorities. That is one area of national interest. The other area of national interest is that we want to see economic growth through CRCs. Even in the public interest CRCs we want to see economic benefits. I believe that economic growth and economic benefits are certainly related to national interest. Through those activities you get such things as increased employment, increased exports, increased incomes, growth of industry et cetera.

Dr JENSEN—You mentioned that the CRC over the years has in effect changed direction somewhat. Do you think that is appropriate? Where would you be directing the CRC process?

Dr Vaughan—Personally, I think it is heading in the appropriate direction. I have a background not only in academia and government but also in industry, so the direction towards commercialisation certainly fits into my personal area of activity. The CRC program was established, without fear or favour, to be associated with both public interest and commercial interest activity. Those were the rules of the game set up under the then Labor government and Bob Hawke was very much a driving force in that activity, under the guidance of the then Chief Scientist Ralph Slatyer. The program has evolved over the last 15 years and there have been a number of reviews. The government has had a number of reviews of the program to see that it is meeting objectives. As an outcome of those reviews, particularly the last review that was held, there was the emphasis that, to meet the national interest, the program would be best directed towards commercial outcomes. The minister accepted this and the new guidelines were written with an emphasis on commercial outcomes. That is the way it evolved. I think people have accepted that.

Dr JENSEN—With respect to the CRC structure funding model, do you think that is a good model? Is the time frame for funding appropriate? Does the relatively long time frame exclude a fair number of SMEs from the process?

Dr Vaughan—The funding model was established again by Ralph Slatyer the then Chief Scientist and the government accepted that and the seven-year model seems to have stood the test of time. It allows for the development of a commercialisation plan and for reasonable outcomes. It has been shown that, for some centres, it is worth going for longer than that. Some have been very successful within their seven-year program and continue on in their own cooperations outside the CRC program or develop a spin-off company or whatever. So the seven-year cycle seems to be pretty good, especially when it can be extended and renewed on a value judgment and a competitive basis for those centres that are renewed.

The involvement of SMEs is encouraged within CRCs. There are various mechanisms by which SMEs have come into the program. Some indeed come in and sign up for seven years. A lot of SMEs say, 'We can't face that. We don't know what we're doing tomorrow, let alone in seven years time.' So a number of CRCs have started up associate membership for SMEs, SME clubs et cetera, where SMEs can come and go, where there is a special facility for SMEs to participate in programs et cetera. The involvement of SMEs is a critical part of the program and the centres as a whole have adopted various mechanisms of introducing SMEs into the program. The SMEs vary. In agricultural CRCs a single farm is an SME, and in other CRCs there are participating SMEs which have 50 to 100 employees. There is a whole spectrum and range involved.

Dr JENSEN—There must be a reasonable amount of complexity with this associate membership. If the CRC is successful and there is considerable success, let us say in an innovation that goes to commercialisation, how do you determine with the associate members the position they hold in terms of royalties?

Dr Vaughan—Again, it is left to the individual CRCs to come up with a plan that meets the needs of their members. Every centre not only has a Commonwealth agreement—the agreement that Frank Larkins was talking about—but they must have a centre agreement whereby they set up the programs and arrangements and understandings that they need for their particular members, their associate members and supporters. The actual participants who commit themselves to seven-year funding are the ones that sign the Commonwealth agreement, but the centre agreement will look after not only those people who are the core participants but also the supporting participants, associate participants and other activities of the centre.

Dr JENSEN—My final question depends on how you define success and failure. I think you mentioned that we have had 99 CRCs all up when you consider those that are ongoing. What percentage of those would you say have actually been commercially successful, given that the imperatives have changed so they are now economic rather than focused on the national good?

Dr Vaughan—It is hard to judge and give an absolute figure. I do not think you would say that most of the environmental CRCs—of which there have been quite a number, although that number is diminishing now that the program has a commercial flavour—have had commercial successes. Nevertheless, there is no question in my mind that they have had national benefits. I would say that at least 60 per cent of all centres have had commercial outcomes and there have been real pay-offs: viable spin-off companies have come out of them, products have come out of them, or the participants have gained commercial benefit. It is hard to measure. The mining CRC has never made a penny directly, but its participants—the BHPs, the Rio Tintos, the coal producers of Australia—have held their positions internationally, they have been able to maintain competitive prices for the coal industry and they have been able to improve production methods through new dragline technology et cetera. The commercial benefit there is enormous, yet that centre may not be seen as a commercial enterprise in its own right. The commercial outcome happens very much downstream with the participants.

Can I come back to one other point that you mentioned: the seven-year funding model. The other issue with the funding model is the leverage. The Commonwealth dollar brings in something like another \$3 to \$4 on top of every \$1. Some of that is public money, but a lot of it is also industry money. Through the life of the CRC program, the commitment by industry to the program has doubled. The industry commitment to the program gives an indication of the success.

Mr JENKINS—One of my questions—asking for examples of solely public-good CRCs—has been answered. Besides the environment are there any other areas that you would identify?

Dr Vaughan—The CRC for Aboriginal Health is a public-good CRC. It has some research activity linked to some aspects of the drug industry through the Menzies Research Institute in the Northern Territory, but its activities are primarily educational—health education for Aboriginal communities. That is a public-good CRC. Nevertheless, if you can save a few per cent of the Aboriginal health dollar, you could call that commercial in a way as well.

Mr JENKINS—I will not pursue it any further, you having partly made my case. Does your committee look at the vetting of the internal agreements?

Dr Vaughan—The committee does not look at them. The department gets a copy of the centre agreement, but we do not vet it. We require it and we believe that, when all the participants of a CRC come together and they are happy to sign off on their own internal agreements, it has met their needs.

Mr JENKINS—You made the comment in your submission that the CRCs have helped to create a culture of collaborative research. Would you like to make further comments on the extent that that flows on to cooperative commercialisation? Has it improved a culture where, because of the industry linkages, there is a greater understanding of what is required to take the next steps?

Dr Vaughan—I feel pretty confident that that is the case. One of the great examples is the composite structures CRC, which was looking at fibreglass, if you want to put it in simple terms. The technology that was developed through some universities in particular with the Defence Science and Technology Organisation was picked up by Hawker de Havilland and that led to enormous contracts for Hawker de Havilland. The outcome of that CRC research was actual manufactured products. So every time you get on a 737 aircraft you should look at the flaps, because they are made in Fisherman's Bend, exported to Seattle and are part of every Boeing 737. The tail fin on every 777 is made at Fisherman's Bend and exported to Seattle. They now have contracts to use CRC technology on the wing flaps et cetera of the new Boeing 787 jetliner and they have contracts with Airbus. There is a flow-on of commercialisation out of a CRC. There are examples like that through quite a number of CRCs.

Mr JENKINS—From both your involvement with the CRC committee and your other interests, would you like to make a comment about whether we have an adequate number of people skilled up to be the skilled pilots, the entrepreneurs, for these technological fields—people with the understanding of, as was described by previous witnesses, the differences between this style of entrepreneurship and other styles?

Dr Vaughan—They are there and they are coming, through CRCs—for example, one was in molecular engineering. A company called Ambri was spun off and has been floated on the Stock Exchange. The driving force was the person who was the CEO of that CRC. After one cycle of funding, over seven years, they saw the opportunity to have a spin-off company. That person became an entrepreneur and the company is running along fine. Another one is on tissue growth and repair. Leanna Reed is very successful academic and, after two funding cycles of a CRC, she spun out a company called TGR BioSciences—TGR stands for tissue growth and repair. She, as an entrepreneur, is now running that very successful company in Adelaide. So there are cases where entrepreneurs have come out of CRCs and I think that this will increase as what I have referred to as industry-ready graduates start making their impact in industry as a whole.

Mr JENKINS—The objectives that you are using talk about the development of sustained research centres. How do you put a ruler over that to look at it? Is it sustained in the sense that it does not need the support of the CRC program or is it sustained in that there will be a stand-alone outcome or is it sustained in that these centres could be adequately funded from other sources, which you admit can sometimes be under that leverage?

Dr Vaughan—I think it is a bit of everything. It depends on the centre and the style of the centre itself. The sustained activity comes from the hope that, after a funding cycle or even two or three funding cycles, there will be continuity in the outcomes from that centre.

Mr JENKINS—So you have adopted a flexible attitude?

Dr Vaughan—Yes. One of the strengths of the program is the flexibility within it. All the centres are very different. They are run by their own individual boards—skills based boards with people who have enormous and successful backgrounds in industry and related areas, whether it be in commercial, manufacturing, venture capital et cetera. These people give their time to the CRC to drive it and, nowadays, with a very commercial outlook.

Mr JENKINS—You paint a rosy picture. What are some of the things that have been difficulties for some of the CRCs?

Dr Vaughan—Some of the difficulties include the change in research culture that CRCs have brought about. Some of the participants in CRCs, particularly the university and CSIRO people, have seen a change in their academic and research provider outlook. As a background, they have always been directed towards publishing scientific results—publish or perish—whereas in a CRC very often they have to look at commercial reality and not publish until patents and related issues are finalised. That means they have difficulties perhaps in their career path, because for career paths the university will count very heavily towards publications and a person in a CRC may not meet those requirements. There are difficulties in some centres at the CSIRO. Sometimes there is a clash of opinions on the management or the ownership of intellectual property between the members and CSIRO. Those things are sorted out in time within the centre. The advantage of having these skills based, independent boards at present is that they get over those difficulties.

There is no question that there have been difficulties—you are never going to throw these people together and expect absolute harmony. But there is no question that the model has been successful and that the people do work together. As for the difficulties that the universities said they were concerned about—the agreements they have to go into—if they were really concerned they would not apply next round. And the universities have applied very strongly every round within CRCs. There is another selection round for next year, the terms of reference for which are yet to be announced by the minister. Even though Frank said the universities would pull out, I can tell you now that the universities will be queued up for it.

CHAIR—Dr Vaughan, thank you very much.

[10.51 am]

YENCKEN, Dr Arthur John Russell, Private capacity

CHAIR—Welcome. Do you have any comments to make on the capacity in which you appear?

Dr Yencken—I am appearing in my own right, not as a representative of any organisation. I apologise that my colleague in this, Professor Gillin, is teaching entrepreneurship in Israel at the moment, and so, unfortunately, he cannot at the same time be here. We developed the submission together.

CHAIR—Would you like to make a brief statement in respect of your submission, or make some introductory comments?

Dr Yencken—My PhD research—I graduated last May—has been about the role of spin-off companies in commercialising university and other public agency research. Before that I was for seven years co-chair of one of the CRC program's expert panels and, for my sins, I am presently acting CEO of a CRC. So you may have some further comments related to that.

The one issue that I ask you to address is the lack of small amounts of money in the early stages—the entrepreneurship stages, you might say—of new venture, new licences, development. My stepson is in the venture capital business—he runs a medical technology IIF. His view is that there is a shortage of investment opportunities for venture capital and there is a shortage of good dealmakers to run them.

In the university or CSIRO context, my research has focussed on the early stage from the point of discovery up to the point where there is a first external investor. As shown by the chart in my submission, you start off when someone identifies a commercial opportunity. This might have arisen out of generation of new knowledge or new technology. There is a process of assessment to decide whether that is worth protecting or whether you publish and put it in the public domain. To do that assessment, you have to do a little bit of market analysis and quite a lot of competitor analysis to try to understand what other people might be doing. You then have to fund the patent protection and, as you know, a patent taken beyond PCT usually costs about \$50,000. In the case of, say, our wood CRC, which has to maintain a small portfolio of patents, we have to budget for \$150,000 a year for maintenance. So you have decided to protect. You then have to decide: are you going to go into a strategic alliance with, say, a major player in the field or are you going to license the technology to an existing company?

In Australia we have the problem of the appalling performance of business investing in research. In America the ratio of business expenditure in R&D to gross expenditure is 72 per cent; in Australia it is 45 per cent. That means that the opportunities to find an existing company to license technology to is not easy here. In America 92 per cent of all licences go to existing companies, not to new ventures. The new venture is quite a rare event. If you do decide to go to a new venture, the first question is: is this going to be worth \$50 million in 10 years time? If it is not, the business angels will not be interested in it. In my 23 case studies, only two cases were

venture capitalists as opposed to business angels and, in the jargon, FFF—family, friends and fools—provided the initial capital.

So you have resource needs. You have to pay for your IP protection. You have what the Americans call the ‘technology development stage’, which is to take the original research to proof of concept and commercial prototype. An investor or a licensee wants technology that works, not technology that is halfway there. Similarly, an investor will not touch anything where the intellectual property is not clean. This is a particularly difficult issue for CRCs, in maintaining this cleanliness of intellectual property when many different parties are involved. Finally, you need progressively more effort in terms of competitor and market intelligence to define your market opportunity and start building your business model.

This all costs money. I have just written a paper about survival of new ventures. I do not have a big enough set of data and nor is the ABS data very valuable in this context. It is very clear that, qualitatively from this, the better resourced and better planned a spin-off company is, the more likely it is to survive. I had two particular groups in my spin-offs, which were very significant. One involved classic, opportunity driven and entrepreneurial ventures where there was a clearly defined entrepreneur. They could be quite successful, but they tended to be what is known as quality of life companies. They are never likely to be high-growth industries. The other group—and this included all the companies from CRC, CSIRO and several from the University of Queensland but not from any other university—had been well planned and well resourced. CRCs have a commercial board now, and they do not let their babies out until they are sure that they have a good chance of succeeding.

You need funding to resource, to plan, to get these things ready and assessed before they leave, and to even make the decision on whether or not to incorporate. In Australia you really cannot get any help from anywhere unless you incorporate. In Sweden you can go into an incubator for a year unincorporated; in Singapore you can get your first chunk of funding—\$50,000—without having to be incorporated. Incorporation is expensive, but liquidation is even more expensive. There is a good case for having funding available around this time when you are making a decision to incorporate or not. In relation to the resourcing of IP technology development, market intelligence and technology that works, it does not matter whether you are going to license to an existing company or a new venture; it still has to be done. The licensee is expecting the same sort of criteria as a new investor.

We have very good programs—COMET, for example. I am chair of a Swinburne spin-off that has used COMET; it was a godsend to us. It is a very good program. Commercial Ready is a good program. The IIFs were supposed to be early-stage venture capital but they are not; they are late-stage venture capital. Pre-seed has a problem. Pre-seed is supposed to help companies at a very early stage, but at a very early stage you cannot get a valuation and to give away equity without being able to give a valuation is somewhat unwise.

I turn now to this issue of small amounts of money. I quoted in my submission the study commissioned by DITR to AIC, which found that in Australia there is a shortage of small amounts of money at the early stages of these entrepreneurial developments. That is, amounts of up to \$2 million, which is well below what a venture capitalist is interested in. At the same time if, increasingly, governments expect universities to be involved not only in teaching and research but also in the exploitation of that research, then the universities have got to be funded for it

from somewhere. You have only got to look at the data for the University of Queensland which I showed in my submission to see how it stands out from every other university because it has set up access to this early-stage funding. It has a very powerful system of finding and accessing the opportunities, whereas with the other universities generally it is the amount of research dollars that determines the number of licences that they execute. UQ is, in statistical terms, an outlier.

Similarly, as I said earlier, I did a study for the CRC Association on their spin-off companies and they have a very impressive history. Again, it is because they prepare their companies before they go out. But their problem is that CRCs are not funded for this full technology development stage for more than about one or two technologies. In the CRC of which I am acting CEO at the moment, we have about six technologies all looking very attractive; there is no way that we can fund the commercialisation of them on our own.

I do ask you to look at what is happening with our competitors overseas—in the UK and the EU. I have also just done a short supplementary submission based on my visit to Singapore a week ago and on what Singapore is doing. They have all had recent initiatives. In the UK it is Higher Education Reach Out to Business and the Community and the Challenge Fund. The European Union sees the generation of new technology based small firms as a very important driver of regional economic growth. You cannot do this unless you find the opportunities, they are assessed properly and there is the funding to get to the point where either you can licence the technology or there is spin-off technology that works.

CHAIR—Thank you very much. You have posed the problem—if you had your way, how would you actually address it?

Dr Yencken—I think the best program I have seen is the Scottish proof-of-concept program. It is little bits of money—a maximum of \$Sg200,000. It is bid for competitively each year, and one of the criteria is that the bidding university has to show that there would be adequate financial and other management independent of the university itself. That has been a very successful program. In Singapore I addressed a class of bioscience graduates who were doing a year-long masters program and learning how to exploit commercial opportunities. At the end of that year they would have little difficulty in getting the first \$Sg50,000, whether they were incorporated or not.

It is something the Pre-Seed Fund cannot do. HEROBC in the UK is a block grant. It is no use adding this onto a research grant. I was doing work in the citrus industry and it was very clear that if the research grant did not quite reach as far as everyone wanted—guess what got lost first? It was the commercialisation component. So it has to be a block grant like HEROBC—HEROBC is about two to three per cent of the university's research expenditure—or it has to be a competitively-bid, small amounts of money program like the Scottish Proof of Concept Fund. Several of us did push this very hard in the consultation that went on before the Pre-Seed Fund, but somehow the view was that IIF was such a great success that the model should be based on IIF. The IIF is a great success for middle- and late-stage venture capital, but it is useless for early-stage venture capital, because the investors, who are mainly superannuation funds, are risk averse.

CHAIR—Thank you very much.

Mr QUICK—Regarding the model you show us on figure 1 on page 2, if the seed funding is available to insert within the program, you will have applications, assessment, someone deciding yes or no, which could be vital to the whole process. From my understanding there will be a need for various injections at various stages, depending on the process and the concept into commercialisation. Do you say, ‘Look, we’re going to need \$300,000 and we will inject \$20,000 here and \$180,000 there,’ or do you have to go through a process of continually asking for injections at various stages? How do the other overseas models work?

Dr Yencken—There are two issues here. Firstly, there is the resources within the agency—the university’s technology transfer capabilities. The University of Queensland has people not just sitting in an office in an administration building but out in the research schools. They have people who are there to help the researchers. When I asked researchers in a study I did for DEST about their career paths, they said they want to continue doing satisfying research. Yes, there are a few who turn into outstanding technological entrepreneurs, but the risk is turning good researchers into bad entrepreneurs. You have to have business development people who can speak the same language as the researchers alongside them and also know how to do the deal making—IP protectors. That has to be funded from somewhere within the university. That is basically what HEROBC funds in the UK. The big missing link here is the first bit of \$50,000 to \$200,000.

Mr QUICK—So you would give Melbourne University \$50 million that could be apportioned out?

Dr Yencken—No, I believe actually that this is something that really the states could do very well. Scotland does it; England does not. There should be a limited fund that can be bid for competitively and there is a maximum amount—maybe \$100,000—that should be available according to the quality of the proposition, whether or not they are incorporated.

In the case of the University of Queensland, the university gave Uniquist, their technology company, a block grant. They told them, ‘This is your capital.’ They have made use of that capital. This is the only university that has actually done that. It has happened, you might say, by accident in South Australia because they sold off an Internet company very profitably and they put that money aside as a fund to support their further commercialisation. In England there is such a thing as a challenge fund. King’s College got £5 million and they went to the City and said: ‘We have got £5 million and we want another £15 million from you, please, City. We will use that to underwrite a portfolio of ventures.’ Obviously an investor feels much happier with a portfolio of spin-off companies rather than a single one, because the risk is significantly reduced. There are a number of ways in which this can be done.

I think the two key things are: how do you make sure that a university has enough resources to have this spoke model in its technology transfer operations and, at the same time, that there are small amounts of money available to someone who has a good idea and that this should be a competitive bidding? If these opportunities do not get developed you are not going to have this portfolio of new ventures and licences coming out that will drive the rest. At the moment I am part of an international study on what sort of policy initiatives help to generate not just new ventures but new high-growth ventures, which is a slightly more difficult issue that I do not really want to comment on at the moment. One leads to the other; and without the first you will not get the last.

Mr QUICK—You state that Australian entrepreneurship policy is all over the place. Who should be driving it: the national government, the state governments, the universities or the CRCs? You talk about the UK, Sweden and Singapore. They are small entities in size and you cannot escape, but here we have a vast country with six states and two territories—

Dr Yencken—Singapore has an entrepreneurship development fund group within government. I think the great risk comes in the interpretation of the word ‘innovation’. We get very worried that a lot of people equate innovation with newness. We tend to say innovation is ‘the exploitation of new knowledge to create wealth’—and that ‘create wealth’ is the important part of innovation. I am not sure if that has quite answered your question.

Mr QUICK—No, I do not think it has. There are a whole lot of funding sources. There are CRCs, CSIRO and universities. There is some collaboration. There are state governments with their own agendas. How do we ensure that—

Dr Yencken—The lobby groups for spending money on research are very strong. There is never enough money for research, almost by definition. The lobby groups for this entrepreneurship stage are very weak. In Australia the word ‘entrepreneur’ tends to have some Western Australian connotations that are somewhat pejorative. I am hoping to get an ARC linkage grant to look at the role of small start-up companies in economic development. Somewhere in DITR or DEST there should be a priority agenda to do with new venture creation. There is supposed to be an entrepreneurship advisory committee, or something like that, but it has not met for two years. There needs to be a focus like the Prime Minister’s Science, Engineering and Innovation Council, PMSEIC, which is producing some excellent stuff, but it tends to be more heavily focused on the research end because the research lobbies are very powerful.

Mr JENKINS—You list the suite of programs that are available to SMEs through AusIndustry and you have clearly identified, both in your submission and your presentation today, where you see the gaps. Could you comment on the suite of programs that are available? You have mentioned a couple and identified what they do not do, but should we be tinkering with them? Do some of them work better than others, right though to the 125 per cent R&D concession?

Dr Yencken—With COMET, Commercial Ready and R&D concessions, I have my reservations about R&D concessions. They are very important in terms of getting multinationals to do more research in Australia, but the sorts of companies I am talking about do not have any profits. I think COMET is excellent. It has been reviewed and it came out with a very favourable review. I think Commercial Ready is working very well and it is well administered. IIF has been useful for middle and late stage venture capital, but I have doubts about the pre-seed fund in its present format—and a lot of us have doubts about it because, if you cannot get a valuation, you do not know how much equity you are going to have to give away. If you have to give away 60 per cent of your equity up front, that leaves nothing for the next tranche of funding, which is likely to be venture capital funding.

I think you have to distinguish between Business Angels type funding, which is what starts off almost all these companies, and the second and third tranches, which will be venture capital. A Business Angel does not do the same due diligence because it is his money. A venture capital

manager has a group of investors, so he has to do a very thorough due diligence. The Business Angel will be concerned with the cleanliness of the IP, that there is a commercial opportunity and with the people, and he usually knows the people—it is usually someone he knows.

Mr JENKINS—Do the Scottish and Singapore schemes fit in between the two?

Dr Yencken—There is Scotland and Singapore, and the European Union framework—I cannot remember which framework number it is. The University of Twente in The Netherlands gets some initial funding through a lot of European Union funding that floats around in this area, so they give people a dedicated laboratory space. At the University of Edinburgh they provide people with access to clean rooms and biohazard areas that no small company could afford, and they subsidise incubator space so it is low rent—and sometimes no rent, just utility costs. There is a range of access to these small amounts of money. Some of them are more informal than formal.

Mr JENKINS—So it is really because of the quantum of the resource that is given over that the risk factor can be pushed to one side and we can get on with business.

Dr Yencken—Yes. Universities are so strapped for cash at the moment that they really cannot put resources aside for this unless they have had a commercialisation success where they can create a capital fund, as Queensland and Adelaide have.

Mr JENKINS—The European models are based on inputs to regional economies, so you championing the states to perhaps be involved is a similar concept.

Dr Yencken—I think it is a sort of level of funding. And if you are going to manage it bureaucratically there will have to be some formal process to decide who gets what, and it brings it a little bit closer. Commercial Ready works well for small amounts, which are done by a Commonwealth agency at the state level; the big amounts are certainly done from Canberra. You could use that model in determining the competitive allocation. You would perhaps not have to do the same amount of due diligence assessment that you would have to for a Commercial Ready grant.

Mr JENKINS—I would like to explore the quandary of the technological push against market pull. As a several arms-length observer, I would have thought that, very slowly, there is a move towards market pull, but I got the feeling from your paper that perhaps you do not even think that is happening—that we are still back where we were several decades ago.

Dr Yencken—The area in which I have been doing research is the area of what you do when you see a commercial opportunity in a piece of new knowledge or a piece of new technology. The market pull is much more in what is now happening very well in the CRC program where you have got enough money—the glue, we used to call it—to keep up a level of generic or fundamental research. You cannot go on problem solving indefinitely without adding to your capital, which is that generic research, but at the same time you have a board which, particularly when you get to year 3, 4, 5, 6 or 7 of a CRC, is saying: ‘Okay, we now focus on these commercial opportunities because we know that we’re not funded to handle more than one or two real commercial opportunities unless we spin off a company which can then get Commercial Ready or COMET or something like that to do it.’

When you have a business sector that does not invest very much in research, it is it very hard to get market pull on a university. In a study that we did in 1999 for the ARC on commercialisation practices, we said that a university should have a relatively seamless approach in its technology transfer office. I will give you an example from Sydney university of something that started with someone in a major company saying, 'Can you help me with this problem?' They said yes and he gave some details. The next move was a formal consultancy which led to a large research contract which ended up as with an endowed professorship. I believe most universities tend to say, 'This is the group that does our spin-off companies; this is the group that looks for research contracts,' and they do not speak to each other. When I was chair of Anutech I did not think we had the management capabilities to spin off companies but we would handle anything from a consultancy, particularly where there was hostage insurance, where we were asked to sell to Nepal a reforestation project, or the Chinese eucalyptus research project to new laser technology for making digital chips. We did not say, 'We only do this or that.'

It is very important that a university has one integrated unit concerned with its external technology relationships, whether they are research contracts, consultancies, spin-off companies or licences, because one can lead to the other. There must be feedback from the outside world to the inside world about needs and problems. There are many good researchers who say, 'I need to be in touch with my industry to know what my next research direction is going to be,' but that is not all that common.

CHAIR—Thank you very much. That was very interesting. Further down the track, the committee might pursue with you some of the ideas we have discussed.

Dr Yencken—Thank you very much.

[11.26 am]

LAYER, Mr Peter John, Chairman, Project and Activities Committee, and Vice-President, Australian Academy of Technological Sciences and Engineering

RAE, Professor Ian David, Technical Director, Australian Academy of Technological Sciences and Engineering

CHAIR—Welcome. Thank you for attending and thank you for your submission. Would you like to make some introductory comments?

Mr Laver—Yes, very quickly, Chair. Thanks for the chance to talk to the committee. We commend this topic, particularly the pathways aspects of it. We have talked a lot about generating innovative ideas, but it is about time we started talking about the pathway from that towards something else. The academy has had a long interest in this and in fact you will find in our submission a condensation of the outcomes of a number of seminars and conferences that we have held over the last five or six years. It is something that is very near to our heart, particularly for our New South Wales colleagues who have mostly driven that. I want to make a couple of points that emphasise things in the submission. I am happy to talk about anything in there, but maybe we just need to put a slightly different spin on them. One is to do with the question of people. I will be talking about things that are contrary to some of the evidence you have heard or seen in some of the other submissions.

Entrepreneurship is a bit like football: you cannot teach it, even if you have some basic skills, but you can actually refine it by doing some things. So I am not exactly sure the academy believes this rush to teach entrepreneurship in universities is quite as productive as it might be. If you could identify entrepreneurs and help them hone their skills, that would seem to me to be a better way of looking at it. In our submission, we talk about a couple of ideas in that area of mentoring and providing some sort of support for young entrepreneurs who have shown some skills in that area and exposing them to what is happening elsewhere in the world or elsewhere in different industries and various other things.

There are quite a number of scholarships and various other things available. I am involved as a judge of the Victoria Prize. We give 10 Victoria fellowships each year to young researchers to go and look at what is happening around the world or attend conferences and so on. It is about time we started to give similar support to young entrepreneurs to go and get their hands dirty seeing what other people are doing. We should start to develop some ideas along those lines. We have the excellent Federation Fellowships Scheme, which was introduced in the last few years, which has brought some brilliant researchers back to Australia and actually kept some brilliant researchers in Australia who might otherwise have migrated.

Again, the sort of thing we should be trying to look at is how a similar scheme can be extended to what we call the entrepreneurs. I am not sure I really like the term ‘entrepreneurs’ very much. It had a bad smell about it back in the 1980s, I guess. But they are the people who are prepared to take technology that they might not have developed themselves and to actually bring it into something useful. So the people factor is more than just more entrepreneurship

courses in universities. It is really looking at a whole portfolio of things that might be able to be done to encourage people to act in an entrepreneurial way.

The second area that I would like to talk about—and, again, it runs contrary to the submissions and from what you have just been hearing—is the mind-set that innovation is through small spin-off companies where someone invents something, mortgages the house or finds a business angel and then builds up the company somehow or other. That is necessary but it is not sufficient. In fact, it is far from being sufficient. Real innovation takes place where people already have money, where people do not have to mortgage the house and borrow from grandfather but where they work under the shelter of an existing company that has cash flows that actually allow them to do these things. Policy really needs to do some thinking about how to encourage those companies to act in a more entrepreneurial way.

I have spent my life working for a very large company, and the whole basis on which they evaluate investment is risk versus reward. It seems to me that if there is a role for government—and we assume that this is a parliamentary inquiry directed at trying to identify what government could or should be doing—they should do something to reduce the risk relative to the reward so that larger cashed-up companies can actually promote Australian innovations. The big problem with big companies is that they are bit like elephants walking amongst chickens: they occasionally tread on these chickens; they do not understand each other, if you like.

Maybe it has to be an umbrella type approach where entrepreneurial behaviour can be fostered—and I hate to say it—by tax breaks. Unfortunately, the most entrepreneurial people in Australia are the people who can work out how to rot the tax system, but if we put as much energy into technological innovation as we do into that I think the country would be well ahead. I would like to see programs that somehow or other reduced the perceived risk relative to the reward so that large companies could support and foster these innovators—with a view to taking them over or floating them off or something—and we could get away from this idea of needing angels to start off with and then venture capitalists.

I want to talk briefly about venture capitalists because, again, there is some mythology about it. Everyone says there is plenty of venture capital money around. There is, there is no doubt about it, but there is also a shortage of good ideas. There is a problem particularly in Australia for the sorts of innovations that Australians are good at—that is, capital intensive innovations. There is venture capital around if someone has a new bit of software or something that can be done relatively simply in the garage. But if, for instance, you want to develop ceramic fuel cells for four or five years, as I did, it is capital intensive and you are using shareholders' money to try to develop them.

It is extraordinarily difficult to raise the big chunks of money you need for the types of things where physical assets are involved. Yet, when you look at the sorts of things that Australia does well in—medical science, energy, resources and the like—these are capital intensive type technologies. In medical science the capital is for trials and so on, quite often for new developments. So there is an important distinction to be made here. If you get the mind-set that innovation is something that begins with an inventor who starts a spin-off company and tries to grow it, it really is going to be a struggle—unless they are 'smell of the oily rag' type technologies that require brain power rather than physical resources.

I would like to have a word on venture capitalists. I have the scars on my back to prove that venture capital is not a very satisfactory way of working. It would be far better if we could have large companies prepared to support new technologies, through something that gives them some incentives to do so. Venture capitalists have two aims. One is to dud the initial innovator. They want to buy in as cheaply as possible. Some of the term sheets you see from venture capitalists are just unbelievable in terms of the way they dilute the original inventor's idea. That means that the inventor is probably not going to worry about inventing much in the future. Secondly, venture capitalists need an exit strategy, so they are not long-term investors. If they are not bad, they will stay there for four or five years but they need something that says, 'At this stage we'll take our money out, and rape and pillage some other inventor.' It seems to me that that is not a model that is going to be successful if we are going to spawn the high level of innovation that we require in Australia.

I have a throwaway line at the end, because it is something that is near and dear to the academy's heart. Our education system right from primary school raises people to be employees rather than employers—so that they do not think in terms of running their own businesses. There is no encouragement for that sort of behaviour. There are too many people being wasted because they are streamed out of the fundamental streams that lead to science and engineering type studies. We need a change in culture right through school. DEST is doing a technological and engineering skills audit at the present time, which I think will probably bring a lot of these things to light. It probably would not be a bad idea if your inquiry and that audit could piggyback off each other, because I think it really gets to the heart of the mind-set that people coming through the education system have when they finish.

Prof. Rae—The field we are looking at is a very diverse one. We have concentrated on industry in our discussions. If you look at the list of people who come through, they are mainly from big industry and they say interesting things. Some of them, including Peter Farrell from ResMed, say, 'The guys we are looking for worked for a large organisation, got thoroughly dissatisfied, had gone out and got an MBA and were ready to hit the ground running.' This is the brainpower type of innovation that Peter is talking about. We have been closely associated with an incubator in Sydney, in the old Redfern rail yards. You might have come across it in your work.

Mr QUICK—We visited that.

Prof. Rae—It is a pretty spectacular place but it is very much a brain power operation, with some very impressive people. Some of our fellows, incidentally, have worked and grown up there. We see that model very clearly and that is the one everybody talks about. But when we get together our people from larger businesses—Wal King, Leightons and businesses like that—they talk about a different model. They acknowledge that people get fed up with their companies and move out to do it themselves. I am more of a theorist—Peter is a practical man—but the literature says that big companies often will not take on those sorts of innovations because they are simply not on the right scale. If you are running a \$300 million turnover company, you are not really going to be interested in something that makes you another million. That is why people get fed up and leave.

We have been questing with the companies. The reason we are still going with these sorts of seminars and workshops—and we have another major one coming up next year in New South

Wales to talk about innovation—is to ask these questions. How do big businesses nurture those innovations? How do we change the culture? We are not standing back and saying, ‘Business is stupid; they ought to do what we tell them.’ That is clearly not true—businesses make decisions for very good reasons—so we have been trying to probe our fellows to find out why businesses do not do it. I alluded to one; scale is one.

But there are other ways of encouraging innovation. We are talking about mentoring people within a company who look like innovators. People who may not have had training in school or anywhere else may show that flair on the job. How does a company handle that? How do they take advantage of it? How do they advance those people? We have even looked at starting another division of our academy to pick up these people. Our academy is not something you can join by writing to us and saying, ‘Hey, I’ve done a lot of good things; I’d like to become a fellow.’ It does not work like that. It works the other way around. We receive nominations from our present fellows for people whom we can consider to elect to fellowship each year. The other three academies—science, social science and humanities—work the same way. So it is a prestigious offer to be asked to become a fellow of the academy.

We are looking at people who have had substantial achievements before they get elected to fellowship, and we would like to somehow tap earlier into this range of people whom we think will probably be fellows in a few years. But we need to take some risks, and we are not sure how to do that. We understand that it is a very important part of professional recognition for young, striving, innovative people who are largely in big organisations, so we have been talking to those organisations about how we manage that process. That is all I needed to add to that.

CHAIR—Thank you, Professor Rae. I will pursue your opening analogy on footballers, skills and innate skills, which I am very taken by. Don’t we have all these huge training programs for footballers in every school and eventually somebody—

Mr Laver—You identify the good ones and apply the—

CHAIR—Yes—from a process; they do not just leap out of the woodwork saying, ‘Kick the ball to me.’

Mr Laver—That is right; they have to emerge and be identified. If I went to a football school, I think that I could probably spend 10 years there and still never play centre half-back for Melbourne.

Prof. Rae—The Australian Institute of Sport might be a better—

CHAIR—Yes, but certain people objected to that at the time too. Basically, what you are saying is that, while you need some level of education or transmission of knowledge to identify the people who might be good at it, you are not going to create those people.

Mr Laver—We need a system to identify them and to give them the tools to work with, rather than a one-size-fits-all approach of, ‘I’ll look up a list of courses I can do at a university. Ah, I’ll do entrepreneurship.’ I do not know that that will lead to a lot more entrepreneurs.

CHAIR—A bit like English lit.

Dr JENSEN—On the entrepreneurship, I understand what you are saying about entrepreneurial skills being inherent and not something that is taught, and I could not agree more. However, I think there is value in teaching scientists and engineers entrepreneurship, because, even though they may not become the world's best entrepreneurs, at least they would understand the process. They would have some idea of how to go about it and maybe how to get this person walking alongside them guiding them through the process. We have struck a number of people who have had innovative ideas, but, quite frankly, they have not had a clue how to go about being entrepreneurs. What is your response to that?

Mr Laver—I agree with that. I guess I was trying to attract Harry Quick on school education.

Mr QUICK—I will be on that in a minute.

Mr Laver—It is in the education system as a whole where you just have to teach that culture. As I said, we teach people to be employees rather than employers. If you do a project at school, you should be asked how you would set up a business to do A, B and C—that type of thing, something that makes people understand what risk is about and how the total thing fits together, rather than just the bits of it that seem to be there at the present time. It is a cultural thing that, unfortunately, we lack a bit in our education system, right through to university. A final year engineering project should not be to design a bridge; it should be to write a business plan for a bridge to go over wherever, taking in all the factors, including the design, and saying where you are going to get the money from and what use it will have—all those types of things. It has to be that type of thinking that goes into some of the systems.

Dr JENSEN—More complete, rather than—

Mr Laver—That is right—to look at it as though it is part of business, rather than just a smart bit of technology.

Dr JENSEN—You also mentioned the issue about big business not investing in innovation due to economics of scale. Is there a bit of a problem there in the understanding of businesses of some of this stuff? You mentioned a \$300 million business not worrying too much about \$1 million, but 50 lots of \$1 million investments might add up to a lot of money, albeit in small chunks. Do you think there is a lack of understanding on the part of big businesses?

Mr Laver—The sort of nuance I wanted to put in that is that I agree that big businesses tend to stick their knitting. They do not like to be diverted by trying to manage small things that they do not understand. Their culture is different. We need a system that acknowledges that but encourages them to invest—maybe to leave them there as separate businesses but to encourage them by saying, 'Okay, if you put some money into that, you will qualify for your 125 per cent R&D concession.' So it is later-stage support to nurture smaller businesses that would be sufficiently close to them that, if they are successful, they might want to take them on as a new product, a new division or something like that. If they are not, they might like to sell them off or do something with them. It keeps them at arm's length so that they do not kill the entrepreneurial spirit that exists in the small business.

Dr JENSEN—Is what you are talking about almost something like the government, in effect, paying for research through ARC grants? We as members of government do not go directly to

the people doing the research and hear what they have got to say in order to determine who gets the research money; we have got this intermediate body that does that work. Are you suggesting a similar sort of scheme for big business?

Mr Laver—I think that would get very messy, would be hard to administer and would be interventionist. The skills probably do not exist in government to understand it. I think it has to be a blunt instrument. Someone in a previous submission said that a 125 per cent tax concession for R&D is a bit of a blunt instrument in some respects, being sort of ‘one size fits all’. But to be able to say in a situation like this: ‘Hey, there are some tax advantages in you, a large company, taking on an investment in this small start-up company. We are actually reducing the risk that you would see.’ That is really what we are talking about: something that changes the perceived risk-reward relationship for large companies fostering this sort of development in smaller companies. I would not see it as a granting scheme.

Dr JENSEN—I notice that in that equation you are focusing on one side of it. You are focusing on the risk side and how to mitigate that risk. I guess the next question is how you go about selling the reward side of it to big companies, because to improve the risk-to-reward ratio it is better to work on both sides of it than just working on one.

Mr Laver—The potential rewards are usually better understood than the risks, particularly if it is a small company in an area that the large company is familiar with. I think that they are probably capable of making an assessment there. There does need to be something more to stimulate the innovation culture, because UM, AiG and people like this have made submissions to you with the work that they are doing on innovation exchange and so on. This is trying to foster this sort of culture that actually sees innovation as a good thing, rather than relying on our competitive advantage coming from cheap labour, cheap iron ore, cheap power or whatever it is that mostly drives people these days.

Mr QUICK—I have heaps of questions. The first one is schools and risk taking—they are not into it. I was interested to read about schooling in Finland, where only the people with the highest university potential scores are teachers. It is not the scientists or the doctors with the 100 out of 100 scores; it is the teachers—they have recognition and status.

Mr Laver—Teachers move on into parliament in places like that; that is the problem!

Mr QUICK—Trying to change the system. But some countries must obviously be doing this better than we are. As I stated before, you cannot get a decent maths or science teacher in most of the state high schools in Australia. They are all in the private schools and being paid additional salaries to teach.

Mr Laver—And even they are having trouble with things like physics and so on. As I say, the skills audit that DEST is doing will go into that in a lot more detail. I guess the point I wanted to make is that the HSC or VCE projects and so on at that level need to be recast in such a way that it is not just a research project to collect a whole lot of facts together. It should be to look at how you apply those facts to do something useful. It might not be just business, because there are plenty of other things that it might be—how you would initiate it as a new health promotion program, for instance. Quite a few of those types of things can be done if you can structure them to make people look at it differently to the conventional way that schools do.

Mr QUICK—What would be the role of the academy? Do we give it to you guys and say, ‘We’ll fund the academy to ensure that in every state high school in Australia there are initiatives?’ Do you decrease the HECS component of a science degree to encourage people to take up maths and science?

Mr Laver—We would love to be given a challenge like that. The academy is actually only 700 people who pay their fees each year and—

Mr QUICK—They are the brains of the future.

Mr Laver—That is right, and we would be very happy to participate in some further study that taps into the knowledge and experience of our fellows and their contacts to try and develop some of these concepts in a little more detail than perhaps has been able to be contained in the type of submission we have put in.

Mr QUICK—Is the dialogue with DEST an ongoing thing to perhaps change government policy?

Mr Laver—Yes, we have a dialogue with DEST.

Mr QUICK—Then you would have to have a discussion with the state education departments, which are all over place.

Prof. Rae—There is a good model with the Academy of Science—one of our sister academies—which, over the last 25 years, has produced a lot of school education material in the area of science. We looked at that and thought, ‘We can do the same sort of thing with technology,’ but it takes money and dedicated people. That is the way they did it; we can do it.

Mr Laver—And it takes a school system that is willing to receive it, because I think the average teacher gets inundated with so many different pieces of paper these days.

Prof. Rae—*The Web of Life* was an absolutely spectacular success right across the country. Some of the other things were only successful in Western Australia, for peculiar reasons, but I think it can be done.

Mr QUICK—I like the idea of sending young technology graduates overseas to gain experience and then bringing them back, with the establishment of an expat register. Quite often no-one seems to know unless you go overseas, gain some experience and come back, and the only people who seem to realise it are the company you work for—

Prof. Rae—Victoria has a very good one, which we can recommend.

Mr QUICK—But that is one state out of six and two territories. Once again we do not have this national approach.

Prof. Rae—That is true.

Mr QUICK—Do we give it to the academy to do? Do we give it to the universities as part of their alumni?

Prof. Rae—We have two sorts of international connection. One is the expat. A number of our fellows do work overseas and we actually have a separate section of international fellows who are elected to fellowship, but there are also connections through similar societies to ours in other countries. We just had an international conference in Cairns last month where all those societies came together. We talked about oceans as a linking feature for most of them—I do not know how the Czechs got on, but the rest of us were pretty happy with it. That gives us those connections that we can draw on. We have drawn quite extensively on Israeli knowledge in a lot of our technical work. You will see some of that mentioned in the submission.

Mr Laver—If you felt moved to make a recommendation that we be enlisted to assist in something like this, we would be only too happy to help.

Mr QUICK—It is commonsense: it is in the national interest rather than expecting each of the states to do it. Victoria might be taking the lead in this area, but how do we drag all the rest in?

Mr Laver—We have fellows in every state and territory; we have the networks that are there. As I say, if you receive \$400 a year from 700 people, it is not a big resource base to sit on. Sometimes we just need someone to give us a little lift up.

Mr JENKINS—The submission goes to incubation clusters and also talks about entrepreneurial apprenticeships. How do you envisage entrepreneurial apprenticeships working?

Mr Laver—It would be along the lines of what we have already alluded to. Within a range of areas, starting in universities and CRCs through to small industry and so on, we would identify those with potential in that area. The idea would be to develop some sort of program that exposed them to experienced people, in the same way as an apprenticeship works. The best way of learning these things is by seeing them and being part of them, rather than by sitting in a classroom and talking about them.

Mr QUICK—Is there an age limit? We identify gymnasts at about the age of eight and swimmers at the age of 10 or 11. Can you identify entrepreneurs in grade 6, and should we pull them out?

Mr Laver—Good question. I think you probably can. You do see some schoolkids who get pretty involved in these things. There are entrepreneurial type programs in schools, but they are pretty small. They tend to get the really bright kids who end up going into medicine and are never particularly entrepreneurial again. It seems to me that it is not age dependent. You probably need a system that can identify a 30-year-old working in a bank who is showing some vigour so that they can apply for a travelling scholarship or something—we have not thought the details through—that exposes them to some of the things that are going on in the world in the hope that that encourages them to move in that sort of direction.

Mr JENKINS—Without taking you literally and grabbing the bloke or the woman out of the bank, what about the notion that in this area there needs to be, in the entrepreneur, empathy towards applying technology and using science and things like that?

Mr Laver—From a personal viewpoint, I do not think that is quite as important. You certainly need it for the researchers. For the next stage you need a person who can understand it, but they do not need to be a technical expert. If you look around you see that a hell of a lot of the entrepreneurial characters, so called, are really people who have understood the possibility of technology rather than developed the technology themselves. So I would not get too hung up on saying that they have to be technical experts themselves. In fact, again from personal experience, the worst type of entrepreneurs are the people who love their technology so much that they do not want to pass it on to anyone. They do not know when to let go. A good scientist is not necessarily a good business manager.

Prof. Rae—There is a nice example with John White, who is one of our fellows. With his waste management systems that he is now starting to sell the technology is not all that flash. In terms of gravity separation, blowing things out of the way and picking up by magnets and stuff like that it is sort of schoolboy technology. But, boy, if you have a contract to handle the whole of western Melbourne's waste—to segregate it and recycle and so on—that is big business. That is what he is doing, here and overseas. So, as you say, you do not need to be the flashiest technologist but you have to have a knack of seeing where you can apply it and being prepared to put some effort in.

CHAIR—How different is it from what people say happens all the time, which is that big companies send people trawling around the world, trying to find ideas that can be utilised? Is that what you are actually after?

Mr Laver—No. I think it is the stage before that. It is about encouraging larger companies to set up almost an internal venture capital system to attract those sorts of people there to go and look for companies to invest in and support, but consistent with their own business plan. It is not much use otherwise. I worked for BHP all my life and when Barry Jones came to me, when I was running research there, and asked me whether we would take up gene shears, I said, 'Barry, we're a mining company. We're not exactly sure what we would do with genetic technology.' You cannot take that sort of leap, because you are not really adding any value. Had he come along and said, 'Here's a new technology to explore for minerals under the sea,' it probably would have grabbed our attention.

It is that sort of match that you need. But you do not want to take it on yourself because you will kill it. You will smother it because you will subject it to all the systems and all the overheads and various other things that the rest of your business has, and people will be running off to training courses and safety meetings and so on. You need to keep that entrepreneurial spirit there but be able to support it, guide it and provide some additional resource for it that would not otherwise be available. If there were a system that encouraged companies to think that way, it would solve a lot of the sorts of problems that you keep hearing about start-up companies and spin-offs and the like.

Prof. Rae—The connection at the minute is largely through their marketing departments. If you were making cars, you would talk to your customers about their cars and ask: what do you

want? They want cars that are easy to park and that use less fuel and they want the tax taken off and various other things. But they are still just building cars. You never see anything really innovative because you get trapped in that path of building cars. Some companies have had blue sky groups looking ahead and asking: where is the company going to be in 20 or 30 years? Telstra used to have one. Somehow it has slipped up because they are still talking about putting wires out into the bush instead of radio waves. Those sorts of groups are where you are going to find these bright ideas that need supporting in the company, and very few companies have groups like that. They are more likely to have incremental change groups.

CHAIR—It seems to me we are talking about a whole lot of different things that are coming from almost everywhere, to be perfectly honest. You are not talking about one phenomenon or one group; you are talking about the capacity to adapt. Is there anything else you would like to touch on?

Mr Laver—We wish you well in your endeavours.

CHAIR—It is going to be complex.

Mr Laver—I would repeat that if you see some ways that our academy can assist—we keep saying that, if our fellows are not the 700 top applied scientists and engineers in Australia, we should get rid of them and get the 700 who are—we do have that resource that we can muster. They are ready, willing and able to do so if there is something that you can see that we can work in partnership with government on.

CHAIR—Thank you very much.

[12.02 pm]

FOX, Dr James Charles, Deputy Chairman, Australian Innovation Association

CHAIR—Welcome. Thank you for coming. Do you have any comment to make on the capacity in which you appear?

Dr Fox—My day job is the chief executive of Vision Systems Limited.

CHAIR—Would you like to make a brief opening statement.

Dr Fox—I would, thank you. First of all, I will give you a quick background on the company. It is company we started from scratch in 1987. Our business is now 90 per cent based on revenue sourced from offshore. All of our revenues come from technology based products or services, with the largest sector being health care. This year just gone, we will have turned over around \$170 million, of which \$150 million is based on offshore revenues. The products and services are around cancer detection. We manufacture the instruments here in Melbourne. We have 60 molecular scientists who create the antibodies that find cancer in tissue samples and we have a contract R&D company that works largely for American and European organisations developing instruments that they then also sell. So we share our R&D resource offshore to give us international scale.

We have gone from zero to a company that is totally export based and totally built around technological innovation. Our R&D budget for this year coming is around \$20 million, so we put our money where our mouth is. It is worth noting that the market we operate in here is about two per cent of the world's GDP. When you have a good look at the challenges that face companies, if they do not think global from day one, they will surely die. There would be no company in the US or Europe who would narrow themselves down to two per cent of the world's GDP and then spend a whole lot on R&D. Whether the science is sourced from the public domain or whether it is sourced in-house, you will go bust. So you have to be thinking about selling and operating outside Australia from day one.

I will divert slightly to Peter Laver's comments about the tax concession, to set the record from a practitioner's point of view. I think the tax concession is a vital part of the landscape for encouraging industry based R&D. There is no question that the problem we have is that there is not enough of it in industry, where money meets ideas and people. Our science base is terrific. I say that as somebody who has just been fired from the ARC board, along with everybody else. You see some sensational science around this country. We really do not have a problem. Science is well funded and there are some great people in it.

The problem we have as a nation is that on the industry side of things we are subscale. If you want to see more of this activity capitalising on the public spend then it has to come from the private side. You cannot force it out from the public side; that would be a waste of money. The tax concession is a blunt instrument, but it passes a number of goodness tests. Earlier I said that any company that is investing substantially in R&D in this country has to be an exporter by definition or it will not survive. That is a good thing, because you are creating skill based jobs

and a foreign income which gets dispersed amongst suppliers, staff and so on. We have a network of about 200 suppliers and about 700 in-house staff. Were we to do everything in house, we would have about 2,500 people. All those people are out in other companies.

The tax concession, firstly, requires a company to spend its own money first. There are no grants and no receipts up front—you have to bet your money first. Secondly, you have to make a commercial decision about all that because, unless you are successful—in other words, profitable—a tax concession by and large is worth nothing to you, because it is an offset against tax payable as its principal model. If you are successful, basically the rules say, ‘We’ll leave more cash with you. You pay less tax and keep the cash.’ That is a self-reinforcing model. Nobody is required to pick winners except the people who are putting up their own money, and all the community is saying is, ‘If you’re successful, we’ll leave a bit behind with you.’ These days it is about seven cents in the dollar. When we started up our company in 1987, the tax concession was a vital part of that landscape. It is still important. It has been diluted over time. Corporate tax rates have come down, which is a good thing. So its impact is less, but for us it is still vital.

There are two things I would do to it. One is that I would bias the concession rate towards higher R&D spenders on the basis that a company that spends one or two per cent of its turnover on R&D is probably not going to be a major exporter; it is probably going to be a domestic based company or a commodity producer. But a company that is spending seven, eight or nine per cent of its turnover on R&D would surely be a high-value product or service company selling offshore. There is a way to bias it towards companies that spend more without changing the overall cost of that concession. You can reweight it so that down at one per cent you are at a 100 per cent tax concession and, if you are spending seven or eight per cent of your sales, your tax concession rate might be 175 per cent. You can reweight it towards people who are doing what you want them to do. That would take you away, as I said, from picking winners.

The other thing that is a bit insidious about the R&D tax concession is that there is no time limit. The tax office can choose to go back 14 or 15 years and challenge a return. That is the only part of the tax act that has that, and it is dopey. They are currently exercising that when they are attacking some of the old R&D syndicates from the early nineties. We have one of those syndicates. About \$250 million worth of products have come out of that. We had to provide the tax office with a copy of its own ruling from 1992 because their files are incomplete, which shows you how crazy this all is. People have died and gone to God—

CHAIR—Keep all the letters you have, no matter how old they are.

Dr Fox—Absolutely. It is nuts that every other corner of the company tax act has a limitation of around seven years and R&D for some reason—obviously it was just left out—goes on forever. It is like uranium: it never goes away. Obviously, the longer it goes on, the easier it is to challenge and the harder it is to defend. That is a sideline. There is no question that what was important to us getting off the ground was venture capital. We got going in the late eighties, so we were at the tail end of the Barry Jones sunrise and sunset era. That was important to us. All three of our venture capitalists went broke by 1991. We were an unusual company in that we outlived our venture capital partners. By then we had got big enough to replace them with private equity, and we went public in 1993.

Another point I would make is that, while we are focusing quite hard on science, engineering and the amount of R&D in the place, anybody selling a product offshore will tell you that at least twice the R&D spend gets spent on sales and marketing. If I was to point to an area where there is serious difficulty and serious risk it is not R&D. You can throw engineering effort at most things and usually get them sorted. We have 300 R&D people in our company and, by and large, we get there. It might cost twice as much and it might take twice as long but, by and large, if you are committed to it commercially you will get it there. The really hard bit is selling the stuff: getting customers to accept an invoice and send you cash. As a company, we spend twice as much on the sales and marketing side compared to what we spend on R&D. I would say that is the highest risk area of the business, particularly if you are like us where, out of our \$170 million, 35 per cent of our sales are in the USA and about 45 per cent are in Europe.

The USA are a ferocious market, highly competitive—they use every trick in the book. They sue you for IP, they run you around the courts, they are just a ferocious competitor base, and if you are not well funded and you are not able to withstand that to get into the marketplace then all of the great engineering, great science and great R&D tanks. I think a lot more focus on how companies form up their sales and marketing and what assistance can be given is a key part of this whole train of making a buck out of brains for the country outside Australia. Austrade have been absolutely sensational for us in really difficult corners of the world, from Moscow to Tokyo—which you might think is easy, but it ain't; it is a very hostile, foreign place—and the Middle East. They are a sensational group and have provided key assistance to us. I personally would double Austrade's budget tomorrow as a key step in this innovation process because, if you are not selling offshore, you will go bust.

Finally, a lot of focus is on seed start-ups. We talk about seed fund and venture capital and so on. Most of the emphasis of these sorts of inquiries ends up on: 'We need more venture capital,' or 'We need more seed capital.' It is worth taking Peter's point and using one example under corporate start-up. Many years ago the Nucleus Group was started by a fantastic Australian called Paul Trainor. Under that was Cochlear. That company won the rights to commercialise Graeme Clark's science—which, by the way, took about 20 years from science to product. Everybody expects this will all happen in a heartbeat. The advantage they had by having that company start up under the Nucleus structure was they were already in that sort of general area of complex medical products. They already had infrastructure, R&D, finance, legals, offshore marketing and selling. So that start-up went in under an umbrella which reduced its risk dramatically. In terms of doing everything as a self-standing start-up: 'Find a business manager, tame the scientist, get an accountant, throw seed capital at it and away we go,' you have to do that, because you have to keep ploughing the fields, sowing and hoping one of them springs to life. But I think there should be a bit more emphasis on encouraging the other form of start-up, which would reduce the risk to taxpayers who fund various programs and schemes.

CHAIR—Thank you. I ask you to develop that last point a bit regarding non-seed start-up?

Dr Fox—We took over two companies, one started from CSIRO science way back and the other came out of the Barry Jones era of venture capital chasing deals around. It was a biomedical company and our whole cancer business—which, in terms of our customer base, is now literally 98 per cent outside Australia—came out of that company. It was going bust under the shareholders of the then AIDC. Wormald were copartners. It was a classic, very small business turning over \$1 million or \$2 million, losing \$1 million or \$2 million. In the Wormald

world those days, it was way too small for them to want to put much management effort into it. They could apply the same effort and put many zeros after it. That is what they tended to focus on. The AIDC in those days, like all central funding agencies, were okay at screening and selecting but, when it comes to running these things on a day-to-day basis, not so flash.

It was about to go bust. We bought out those two partners. Wormald stayed with us as a shareholder for a while. We nurtured that. We shut down a lot of stuff. We wound it back to five people. We took the core cancer product in 1988 and just finished selling that 1988 product about a year ago. It happened to be in our space. It was something we took in, nurtured and grew and now that business is a major player in histology based cancer detection around the world. How to encouraging that? Maybe leaving more cash with the company from a tax point of view is a way to encourage that kind of behaviour. If you get the right environment those sorts of deals make sense one way or another, anyway. An overarching tax concession for R&D for this sort of investment can be revenue neutral but a great way to go.

CHAIR—You are saying, essentially, to have effective takeovers of smaller R&D companies.

Dr Fox—Where they fit in the stakes—

CHAIR—If you have got somebody who can develop the product. The only issue is the one you touched on at the end. How do you promote this, other than talking about it and telling people to think about it?

Dr Fox—In the end it is financial incentive. None of us on this side of the fence launch into philanthropic investments at that level. We see it as an opportunity and a product to be brought into a portfolio or company like the Trainor Nucleus Group, who are building a network of health care based companies. There are the strengths that we have as a country. Unfortunately, there are not a lot of companies. There are some scientific instrument companies, which are terrific, and some health care companies. We have a few in that space that have done well. They are fairly focused and fairly tuned in to what they are doing. At the end of the day the ones that have worked best so far have not been the very high risk start-ups but rather the corporate in unders, which are a valuable part of the portfolio. They are not the only part; you would not trash everything else, but I would have that as a key.

CHAIR—But don't underemphasise it.

Mr QUICK—Has any thought been given to using the hundreds of billions of dollars in the superannuation funds? I know there is a requirement that only a small percentage of that be used in venture capital and risk management but it is there. It would benefit the shareholders and the people paying the superannuation in a variety of industries—mining, forestry and the like. Are any other countries using superannuation?

Dr Fox—I think everybody suffers from the same problem that we do, which is that at the end of the day we are all stakeholders in superannuation funds and if it is going to be an economically sensible decision to take then you will take it. We suffer from a lack of track record of venture capital making big wins. Private equity funds which have been doing the latest state stuff have been going absolutely gang busters in this country and have returned a lot to the stakeholders. A lot of the superannuation funds are in those.

Back in the start-up stage—the venture capital stage—there really has not yet been a lot of stellar performance. We have quarterly reporting on superannuation funds and all of us get our superannuation statements and look to see what our fund did this year. The pressure on the trustees is fairly enormous. As a government you can, say, relieve the pressure on the trustees and bias the return for those sorts of investments because at the end of the day you believe that for the long haul that will benefit the community and provide an earnings stream and an export stream. That means you have to bias the financial rules under which they invest those funds. Otherwise they are going to fall back and say, ‘We have a responsibility to the stakeholders.’ We all look up our superannuation value once a year when it comes out and ask, ‘What was the return? What am I worth? Can I keep doing this or can I stop?’ I do not hammer the superannuation funds so much; if we say there is a pool of capital that we want to be disbursed into this sort of activity more then you have to bias the financial returns that that will enjoy or provide a return up front through tax. Otherwise the superannuation funds are just going to fall back and say, ‘I have a responsibility to my stakeholders.’

Mr QUICK—Would it be better to have a national approach to that rather than particular superannuation funds taking it on their own shoulders and bearing all the risk?

Dr Fox—That is where you have an overarching set of financial rules that will encourage them to not allocate 0.001 per cent but 0.5 per cent. Why will they do that? They will do that because the risk they perceive has been now balanced by a return profile that is in part underwritten.

Mr QUICK—The evidence we are getting is that, especially in the health area, a lot of small companies have to ally themselves with companies like Pfizer because they are huge multinationals; two or three pharmaceutical companies control the whole world, so that is the way to go. But if we were stronger financially, we would be able to bargain from a greater degree of security than we have at the moment.

Dr Fox—The mission has to be that in 10 years time you have more robust companies in those spaces in this country that provide the resource and the capability to help the small ones. At the moment, which is the largest pharmaceutical company operating in this country that genuinely invests in R&D and goes after active ingredient product? Who is it?

Mr QUICK—That is right.

Dr Fox—You are facing the FDA, human trials and hundreds of millions of dollars before you even know whether or not you have a product. In 10, 15 or 20 years time we have to have set up a landscape that has, in our portfolio of activities in this country, not just mining, agribusiness, tourism, wine and an automotive industry that is really aggressively pushed along by an ACIS scheme. Without that, would we have an automotive R&D capability here? I doubt it. In the end you have to say, ‘Structurally, we’ve decided automotive is the go, we’re ploughing lots of money into that’. Maybe we have to say, over a 20-year time frame, ‘We want our landscape to look like this, including pharmaceuticals and a broader go at health care.’

Mr QUICK—With an ageing population worldwide—

Dr Fox—Yes. Our largest market in the world is Florida for cancer. Guess why? They earn their bucks in New York and scurry down to Florida: God's waiting room. It is a huge market. We face that worldwide. Health care is a sector and specifically the active ingredient, the diagnosis and then the therapy programs is a cornerstone of where the health care spend is on the one hand and where the community benefit is on the other hand. In the middle of that is a huge industry.

Mr QUICK—I was interested in your thoughts as to whether science and science training is going well.

Dr Fox—I think we have a fantastic science base which is probably from an era where education was free—I am going back 20 years. Most of the people in science and leading science are of a generation where the rules were quite different. Maybe in 10 or 15 years time, from what I see in universities where the impact of some of the decisions rolls through, this will not be the case. It is certainly true that our education system—I will not go over that ground again—is suffering on a science base. You only have to look at the entry scores for engineering now compared to law, medicine and all the others, say 30 years ago, and you say, 'Gee, back then medicine and engineering were comparable.' I remember that when I went to university in 1969 they were absolutely one for one at Melbourne. Now engineering is down below 80 and medicine is still up at 99. So that tells you that the brightest and the best are not heading that way, on average. There are obviously some very bright kids going into engineering and we recruit strongly out of that sector, but on average our brightest and best are not heading there.

Dr JENSEN—What was your experience with venture capital early on? One of the previous people that we spoke to had a view that venture capitalists effectively were just in it to rape and pillage the innovation and then get the hell out. What has been your experience? Was it something that was a beneficial experience? This previous person's view was that we needed to look at getting big business more into funding those sorts of areas rather than VCs.

Dr Fox—Venture capitalism is a very specialist game. They are going to bargain for what they can in a competitive marketplace. If you have lots of venture capital and companies competing for deals then the pricing will come down. We were fortunate to be formed in an era where there was a lot of venture capital and it was all pretty new. That all came out of the Espie inquiry, which was way before your time. Out of that, essentially, the Australian venture capital industry was born.

Our three-page business plan would not be backed today—no way. It was not a sophisticated period. In fact it was so unsophisticated they all went bust. By 1991 they had all tanked. We were able to replace them with private equity and move into our second generation. Were we raped and pillaged? No; we cut deals that we thought were appropriate for us. We did not feel that they were hard negotiations but there was competition. You were not dealing with just one person. To get a venture capital market to work effectively you need enough volume and enough competition so that there is genuine pressure on both sides, not just on one side.

Dr JENSEN—In your view is that the situation today—that you have the balance there?

Dr Fox—You would have to ask somebody who is going through the process today. We did that in 1987, and I have not been back to the venture capital market since 1991 or 1992. We have

contacts with venture capital companies because we have picked up one or two things from them and coinvested with a few of them, and our experiences have been fine, but you would have to ask the investees and those running around the market now. You have to remember that it is a very complex form of investing. You have to look ahead. You cannot just do what the share market analysts do or even what the private equity guys on divisional buy-outs do. They can do maths on historical earnings and know that they are going to be roughly the same going forward or better. It is a really tough form of investing; it takes a lot of skill and it is easily overestimated. Everybody who has been knocked back by a venture capitalist will tell you that it is a crap industry and they do not know what they are doing or that they are vultures. But at the end of the day it is real money and you just need competition. More ideas are knocked back than are accepted, and that is just normal.

Dr JENSEN—The other interesting point that you made is that with your company twice the R&D is spent on marketing and sales. In your view is that money with your company well spent? Are there ways in which you could do it better and ways in which you think generically things in the sales and marketing area could be done better in shifting the—

Dr Fox—All of us want higher productivity out of our sales dollar but the fact is that when 90 per cent of your sales are outside Australia you need customer support, salesmen on the road, 1800 numbers and help lines or you hand it all over to another company and you say, ‘You be our distributor and we will sit back here and make it.’ Frankly, that never works. It is an okay interim strategy. We did that in our start-up years; we partnered with a German company called Leica and we have now moved way past that. We have over 160 people outside Australia now. That is a huge expense. Forever we are on the trail: how can we be more productive, what is our channel to market, how can we get more bang from our intermediaries—the people who specify our product—and how can we get pathology laboratories around the world to lock in on our product? It is a constant challenge. But the underestimation that you often have is that smaller companies, until they have been blowtorched by the reality of the world, think that because they have the best product in the world it is going to beat a path to their door. That really does not happen. You need an adequate product and a great salesman. You do not need a great product and a crap salesman—you’re dead.

Dr JENSEN—So in your view, with the model that in effect you have adopted with your company where you have started off having a third party doing the sales and marketing for you and then you moved into it, would you suggest that that is a way of going into it for small start-up companies that are just getting on the road with that?

Dr Fox—That is a way. All of us—even the big guys—use distributors in marginal markets. For example, in the smaller markets that we operate in we will have a distributor who will handle the business into the marketplace but we still have a person who goes and camps on them, calls on customers and makes sure it is all happening. But in the big markets such as the US and Europe we go direct. Would we have done that from day one? You need a big pot to play, so in our particular financial circumstance it made sense for us to bank our game with somebody else, but in the end we grew out of that, so now we have gone to the next evolution.

In that next evolution, I come back to saying that people like Austrade have really been important in helping us crack open doors, get through government regulations and codes—a lot of the product areas we operate in are festooned in local regulation—and get codes written so

that we are playing on a level playing field against the local suppliers and producers. Our competition comes out the US in the main and Europe in part. We are up against local rule sets, and having agencies that know that stuff and can crack doors open for you is a critical part of it. Again, that is totally underestimated by most start-ups, including us.

Mr JENKINS—You factored the cost of that into your sales and marketing, so that is part of it. Has the FTA with the US changed the landscape?

Dr Fox—No, not that we can perceive. I think 1½ per cent is coming off our duty, but the change is imperceptible. To sell to government health-care organisations you have to be on the US panel, and we had already done the work to get in. We have enough local resource and capability to be a credible player, so we are on it. Under the FTA it may be easier for those coming after us, but I do not know. But for us the FTA has had next to no impact so far.

Mr JENKINS—What type of support was it that you got from Austrade?

Dr Fox—It was help with door kicking, local regulations and getting to people that we could not otherwise get to. Some of it relates to government and some of it to companies. Quite often, we need to get to a large player or potential customer and when we ring up as Vision Systems from down-under, we get one response. But if someone rings up and says, ‘Hi, I am from the Austrade division in the Australian government and I would like to come and talk to you and bring somebody along,’ they often get the door opened. We have found them really helpful with that.

We have another division, which is in video surveillance and fire protection. In fact, two of the images that you saw of the first bombing from London went through our gear. We got written into the Moscow fire code as a specifically named product, and I can say absolutely that without Austrade we would never have achieved that. It was an amazing effort. We are specifically named in the Russian fire code and sales are flowing because of that. So Austrade are a fantastic outfit.

I was a meeting in Japan a few weeks ago. We had a youngish—relative to me—Austrade guy there, who had great business sense, could speak fluent Japanese and could read Japanese. He sat in on the meeting we had with our business partner of about 10 years, who we were having a blue with. He would say, ‘X has just said Y and you need to respond. They did not say it that way but that is what is going on.’ It was absolutely invaluable. He had a business brain and a capacity to open doors. Personally, I would double their budget and get them going.

CHAIR—Thank you very much for your time. That was very useful. We will pass on your comments about Austrade.

Proceedings suspended from 12.33 pm to 1.18 pm

GREY, Mr Ronald Garwood, Majority Shareholder and Managing Director, GBC Scientific Equipment Pty Ltd

O'LOGHLEN, Mr Neil Gerald, Strategic Affairs Consultant, GBC Scientific Equipment Pty Ltd

CHAIR—Welcome. I should advise you that the committee does not require you to give evidence under oath, but these hearings are part of the formal proceedings of the parliament and deserve the same respect as proceedings of the House. I should note that giving misleading or false evidence is a serious matter and may be regarded as a contempt of the parliament. Mr Grey, would you like to make an opening statement?

Mr Grey—GBC has successfully developed, manufactured and marketed a wide range of highly innovative, hi-tech products for almost 30 years—28, in fact. We have developed a worldwide distribution network for our Australian made and Australian owned range of analytical instruments, and 95 per cent of our turnover is derived from exports. We have very practical and successful experience of the pathways and obstacles to technological innovation in Australia. GBC commenced in business by developing specialist markets for atomic absorption—spectrophotometers—which were originally developed in Australia. The IP had been sold to two US scientific organisations, Perkin Elmer and Varian. These companies have since developed into international monoliths, and even today receive preferential treatment from Australian institutions because of their historic associations with CSIRO. They have been of extraordinary economic and scientific benefit to the United States, and represent a direct loss to the Australian national interest, which paid for the original research.

Innovation is not the exclusive province of research academics or imported representatives. Unfortunately, part of academia seems to have developed an aura of intellectual arrogance which demands personal recognition for their publicly funded activities. The funding system which supports many of them could be described as 'capitalistic communism' and, compared with whitebait feeding farms and fisheries, the process generates lots of frisky whitebait which are gobbled up by progressively bigger and more aggressive predators. We suggest that this system demands some form of appropriate management control.

Commercial development of an innovative concept is a complex process involving critical mass of many practical disciplines ranging from physics through engineering, chemistry, electronics, optics, et cetera, to marketing and accounting. The process should not even begin without some real world analysis of the long-term applied feasibility of the concept. GBC views the entire process as very much an exercise in teamwork between the initiator and the developers. No critical member of this team can be viewed as the most significant beneficiary—in fact, if the project does not work, all of them suffer.

Probably, Australia's greatest need in a hi-tech world is the provision of high-quality Australian graduates and postgraduates in the hard disciplines of science, physics, maths, engineering, et cetera. The number of Australian undergraduates has fallen significantly over many years. There are many causes for this malaise, but undoubtedly one of the most significant would be the limitations and opportunities for personal career development. Essentially, there are

three principal employers of hi-tech graduates. One is the Commonwealth sponsored research institutions—for example, CSIRO and CRC. Two is tertiary research and education centres—for example, the 38 universities. Three is private industry. I will address the three.

Taking first of all the Commonwealth sponsored research institutions, with some personal reservations about shortfalls in their appreciation of commercial realities, GBC wholeheartedly endorses the principles associated with such institutions. In the old terminology, research was classified as either controlled or uncontrolled, depending on the outcome expected. There is an unquestioned national requirement for both categories, and these research institutions are ideally placed to provide both. We would suggest, however, that greater interaction with Australian based export industries should be developed.

We would also suggest that all funding grants by the Commonwealth to any institution or organisation should be reviewed by a separate committee for each of controlled and uncontrolled research to examine their feasibility and/or potential outcome and make appropriate recommendations. The committee composition for uncontrolled research grants should be predominantly academic, whilst for the controlled research grants it should be predominantly real world commercial and neither committee should be Canberra-centric.

Taking the tertiary research education centres, Australia's 38 teaching and research institutions provide the principal basis for the comparison with whitebait feeding used earlier. Whilst all universities should provide tertiary education, no more than 10 should be subsidised to perform research—and then only on the basis of 80 per cent controlled and 20 per cent uncontrolled. Similar projects should be grouped within individual assemblies—

CHAIR—Excuse me, could you say that last part again about the balance between controlled and uncontrolled?

Mr Grey—80 per cent controlled and 20 per cent uncontrolled.

CHAIR—My apologies; please continue.

Mr Grey—All projects should be periodically reviewed for achievement against their objectives. These reviews should be performed by the initial recommending committee and the performance should be reported to the minister. The practice of measuring performance by the number of papers published should be discontinued. In the final analysis, only function has value.

I turn now to private industry. The Australian manufacturing and export industry is in a state of crisis. The consequences of floating the Australian dollar have been disastrous for exporters. No scientific industry could survive without electronics, but the manufacture of electronic components in Australia has been almost nonexistent for more than 20 years. Supply price for these components offshore is equivalent to 20 to 25 per cent of the price charged by foreign owned importers in Australia.

Academia and importers combine to encourage belief in the fallacy that any Australian company should regard itself as successful if it is taken over by a foreign company. This has already occurred across the much-vaunted resources and mining industry, resulting in the virtual

disbandment of value-added manufacture in Australia, and in powerful resource based lobbyists loudly agitating for Australia to spend massive sums on its ports to facilitate the efficient transportation of our—or, more accurately, their—mineral resources offshore.

The Australian manufacturing export industry desperately needs some form of government support and assistance. This should be at least equivalent to the incentives offered to foreign manufacturers to establish manufacturing centres in Australia—for example, Varian and Shimadzu. Varian's base in Melbourne is primarily used for research in order to gain the benefit of Australian R&D support, which simply adds to the USA bank of IP. Australian ownership should be an essential criterion in determining export market development grants and R&D grants levels. For taxation purposes, R&D expense within Australian industry could be assessed at 175 per cent, instead of the currently inadequate 125 per cent. Lastly, GBC has been unable to identify any organisation which can effectively represent our interests to government.

CHAIR—Thank you very much, Mr Grey. Can you just elaborate on that last sentence?

Mr Grey—We recently resigned from the Australian Scientific Industry Association. That was for a number of reasons, but one was that we found that they are composed effectively of everything that could have anything to do with science. In other words, we have got the importers, the three manufacturers and a lot of the university people and, in essence, what we find is that, as a manufacturer and exporter, our interests are totally different to importers' interests—in fact, they are the complete opposite. Apart from the fact that the universities et cetera are customers, and in some cases collaborators, we have a very different mindset on nearly everything. In an arrangement like that, the chance of our voice being heard is zero. We have discovered that.

Mr O'Loghlen—Those results were particularly evident in one particular case. We had developed a mass spectrometer which could provide simultaneous analysis of every element on the periodic table within 10 seconds; that is world-beating technology. Unfortunately, it had the capacity to identify uranium—and, whether we like it or not, uranium is a fact of life. As a result, that product—which won awards all over the world—was essentially banned for export unless we complied with the requirements of the Nuclear Suppliers Group, an American based consortium of which Australia is a member. That acted primarily to the detriment of our business and the development of anything else that came with it. It cost us \$15 million and eight years of dedicated research to develop that instrument.

CHAIR—So, essentially, you can sell it in Australia but not outside Australia?

Mr Grey—No. We have gone through a very sad and long process of beating our heads against the Department of Defence and the Department of Foreign Affairs and Trade. At this point, we have resolved the problem to some extent. We have a model we can sell. The biggest problem that remains is the bad taste it has left—and a lot of lost opportunity and so on.

CHAIR—So you could not sell to the Americans?

Mr Grey—No, we sell lots of them to the Americans.

CHAIR—Where could you not sell it to?

Mr Grey—We could not sell into our main market of India, yet we know that the Indians buy American products that are the same—under the table, of course. In essence, you have to remember that the United States has a large number of manufacturers of this sort of thing and it is very easy for them to sell in their home market. For an Australian company, as observed earlier by Jim Fox, the American market is very difficult. In India, GBC is the major supplier of a lot of products. We have just sold 29 sets of atomic absorption instruments for health centres all over India. We have done a similar thing for 19 health centres in Poland. We tried to bring the Indians here to train them so that they could do the installation. They could not get visas. The response was: ‘You’re a dirty Indian and you are not allowed in here. You are probably a terrorist, so no visa.’ We now do all that training in our Malaysian facility which, luckily, we have just got up and running.

CHAIR—Despite my astonishing affection for the department of immigration, I find it difficult to accept that they would have excluded people on those grounds.

Mr Grey—I have no idea what their grounds were, but we have had several cases of it and I have given up even bothering to question it. If they say no, we do something else.

Mr O’Loughlen—A major client from Romania, who was coming out specifically to look at our product, was incarcerated overnight and without question—for what reason, we have no idea.

Mr Grey—But he did not buy anything.

Mr O’Loughlen—He went back without looking at anything.

Mr Grey—In fact, he went home pretty angry.

CHAIR—I can understand that. I find it difficult to understand your notion that publication should not be taken into account.

Mr Grey—My point is that we do a whole lot of science and then ask, ‘How do we measure the success?’ I know how to measure success: I measure it in dollars. Dollars are the means of measurement that any private company has to use. To measure the success of something by the very indirect measure of saying ‘Gee, we’ve been published 10 times’ does not cut any ice with accountants, auditors, shareholders or financiers.

Dr JENSEN—I have a problem with measuring it simply in dollars. Einstein, for instance, wrote some papers on relativity and the photoelectric effect, and certainly in the short term there was no dollar application. Gabor did a paper in 1949 on laser light and the laser was not invented until 1960. Using dollars as a measurement, those very important advances in scientific knowledge would have been dismissed as failures. So how would you go about—

Mr O’Loughlen—We could not agree more. The reality is that there is uncontrolled research and controlled research. We are referring specifically to controlled research. We have no problem with uncontrolled research.

Mr Grey—Perhaps I can simplify the thing. The real thrust of our article is that private industry will utilise the undoubtedly good scientific developments in this country. No government organisation, no CRC, will ever do it. They are just not set up for it. They are not structured. They do not have the bits and pieces they need. Although undoubtedly a government organisation could do it, they would do it at 10 times the cost of a private industry. They would never manage to do it in a commercial manner. No-one could afford them.

Mr O’Loghlen—To add to the dollar criterion, we are intensely interested in the national interest and we are totally biased in terms of Australian ownership.

Mr Grey—In terms of uncontrolled research we have picked up some things from the CSIRO and from universities, but the problem is that 90 per cent of the work that has gone on is not focused on a need. Every now and again something valuable comes up, but the reaction is, ‘What do we do with that?’ It is of interest to 10 guys in a remote corner of Afghanistan or wherever. We need some assistance in the development of our business—in other words, of the products that we need. I know of hundreds of things I could sell, but I do not have the facilities or the money to do them all. I have to do the ones in turn that will provide enough return to do the next one. We need focused money instead of unfocused money, not ‘What would you like to do?’ but ‘This is what we want you to do’—would enable us to build the companies, which in turn would enable us to employ the graduate, which would enable us to generate a scientific, technological society. At the moment, the money is being put into the wrong end. We have a horse and a cart but have not figured out which is the horse and which is the cart. We are putting the money into the cart and saying, ‘Why won’t the horse run?’

CHAIR—Isn’t this missing the point? Do you want to get the money so that you can pay researchers to execute the research that you need?

Mr Grey—No, not necessarily. If we have all these good researchers, why not give them a bit of guidance on the path to righteousness?

CHAIR—How do you do that in practical terms?

Mr Grey—In practical terms you could say, ‘Where is a company that at least has the bits and pieces—the marketing and manufacturing, the R&D, the sales and the horsepower to make it happen?’ You could say to them, ‘How could we help you?’ This could be done without any extra money, but focusing on some of the R&D that is done—which is going to be done anyway—and on building those companies. If we did that we would have lots of hundred-million-dollar companies.

Mr O’Loghlen—We emphasise the importance of teamwork in the development of a commercial product into the international marketplace. The development function is not separate from the original bright idea function. Somebody has the bright idea, the concept, and does the work and regards it as IP. That should be the start of the process. Traditionally, the idea has come from some form of a funding process. There is tremendous competition in academia for access to funds. Funding a resource is a major function—‘If I am to get funds, I will be right.’

Once the brilliant idea has been developed to the IP stage, it then has to be developed and applied in the commercial world so that all can benefit. No part of that process is more important

than any other part. The development and the concept are essential to the entire process. It has to be done by teamwork. It is best not done in the large internationals or it will be lost. It is best retained in Australia. Therefore, if there are Australian organisations that can do it that is the ideal marketplace to put them; it seems logical. To believe our academic researchers, as beacons shining in their own little firmaments, saying, 'God, I've got a brilliant idea!' is not enough. That idea has to be converted into real world technology. Industry has the capacity to do that.

Mr Grey—Unfortunately, we have very little industry. Unless we can build that industry, it will just get worse and worse.

Mr QUICK—On page 5 of your submission you state:

In 2000 GBC agreed to develop and market the MFR from the basic model developed by the Applied Physics Division of CSIRO ...

Can you explain how you worked collaboratively with them to put them in the marketplace?

Mr Grey—One day I got a phone call from a gentleman at CSIRO. He said that he had a very interesting product and he would like to come and talk to me. I said, 'Fine.' He came down and we talked and we looked at it. It was a thing called a micro Fourier rheometer, which was a new way of doing rheometry, totally different, utilising a Fourier transform approach. Rheology is really the mechanical properties of liquids, oils et cetera—in other words, how springy it is and how sticky it is. Instead of measuring the rheology directly, which is the way it is done in this world at the moment, he was measuring it indirectly, using a Fourier transform to convert from a frequency measurement back into the direct time measurement. I looked at that and I thought, 'Wow, what a marvellous idea!' We then took it up and we have done our best to market it—and we have done a bit. We found the usual things with a CSIRO product that does not actually work and you have got to fix something. We fixed the mathematics; they got the mathematics wrong. We fixed it using the CSIRO mathematics division, on a subcontract basis with our people. That is an example of what I would call a breakthrough technology that could make a lot of money for this country. What that technology really needs is applications.

We have a new vehicle. It is like a car that does not use wheels. It would be a new way of transporting things. In rheology, Fourier transform rheology is a new way of doing it. We are here on our own trying to do it, yet there are 38 universities in this country, all of which would have a rheology department that could enormously assist us in basically getting a new technology into the market. We go along and exhibit it and people look at it and say, 'Wow, that is interesting! Oh—Fourier transform rheology,' but what we need are papers written.

CHAIR—What sorts of papers?

Mr Grey—Scientific papers on the application of it. For instance, we could have a researcher at several of these universities saying, 'We will have one of those and we will do some applications on it.' There are lots of potential uses for it. We have identified things that it could be used for, such as bodily fluids: they think arthritis is affected by the viscosity of the fluids in the joint. There is one university that we have managed to get it up and running with. We did it with Melbourne, then the guy moved up to Queensland and he has taken that with him and he is redoing it. That is the sort of thing where the country could operate a lot a lot better if there were

a focus: ‘Gee, we have got this new thing here that came out of Australia that is made by an Australian company, but it is a totally new way.’ That would be a really good way in which we could have focused research, if you like.

Mr QUICK—Do you have other examples of other universities getting in touch with you? Where are they, not only here in Victoria, but in other states?

Mr Grey—We are one of the very few companies that can actually do this. So we quite often get various people coming to us to have us look at their technology. We are a relatively small company, with only 120 of us in Dandenong. We do have operations all around the world. But, at the end of the day, there is a limit to what we can do. We have to focus our resources where they are likely to pay the wages and then, having got one that works, we have got enough funding to provide the next thing. I think if there were a little bit more focus and organisation in the way all this is done, so that people in the country worked together, then the same resources would produce 10 times the result we currently do—with no extra money at all.

CHAIR—Why don’t you just contract the universities to do what you want them to do?

Mr Grey—It is very difficult, and they are very expensive and hard to control. We are not really interested in contracting that sort of thing. That would be an area that is good for research, and we believe that a university could do some research and then they will generate something for the country. If I am going to pay for it, I would rather employ someone and do it.

Mr O’Loghlen—I might add that, of the 120 employees, there are 58 who hold tertiary qualifications, ranging from PhD through to diplomas in engineering of some type. They are roughly split 50 per cent physics and chemistry and 50 per cent engineering disciplines.

Dr JENSEN—With this example that you gave of FFT rheology—what did you call it?

Mr Grey—MFR—micro Fourier. It is a Fourier transform.

Dr JENSEN—You were suggesting that the universities should be conducting research to generate scientific papers as there would then be an innate authority there from the fact that it is in the scientific literature. The question is: what model would you use, if it were up to you to get the universities to take up these new technologies, test and write papers on them and so on?

Mr Grey—I am not quite sure what would work, but at the end of the day, somehow or other, a university decides what it is going to work on. And yet, in the same place in the country, you have got us and probably a few other companies that have these various things. We could put the two together and have the university using them, writing papers and evaluating for the specific users—because it will do some things much better.

Dr JENSEN—Have you sent the rheology researchers at the different universities specifications and background on this equipment?

Mr Grey—We do not have many contacts in that area. We have, for instance, tied up with Melbourne university. I know David Boger in that department. We have done a fair bit there. We actually gave them one and said, ‘Here’s one,’ but they were not really interested because, at the

end of the day, they are doing their own thing. What it needs is someone to manage the overall thing, rather than leaving it up to the universities. If we could get a bit of focus as a nation—

Dr JENSEN—A slight problem that I have with the model that you are proposing is that the people who could best describe the piece of equipment and the benefits of that piece to the university departments would be you and your company—not some overriding third body.

Mr Grey—No, but if there were some way or venue. The universities will have so much freedom to do their own thing—but not all. We need to look at how some of their time can be used to try to facilitate the growth of industry. Make no mistake: if we continue with the very low industrial thing we have got, as soon as we run out of iron ore, we are paupers.

CHAIR—Was that 80-20 split 80 per cent relevant—

Mr Grey—I believe 80 per cent—

Dr JENSEN—Are you talking about that at university or at institutions like CSIRO?

Mr Grey—I think everywhere should be like that. If we really want to make things work, we have to start focusing and putting all our efforts into a team rather than everyone doing their own thing. I heard earlier witnesses saying, ‘Let’s take a few professors and whatever and turn them into entrepreneurs.’ You have got no hope. By the time you have spent 20 years going to the faculty club, you ain’t going to turn into an entrepreneur.

CHAIR—No, but you might find DNA! I want to go back to CRCs. You said that they did not work.

Mr Grey—The coal CRC is a good example. I was down there towards the end of that thing to look at their product, which was a spectrometer for analysing coal. They had made a few and they were doing a reasonable job on coal, and they wanted me to flog it, take it off as a product. I looked at it and I said, ‘I saw the same thing two years ago in the United States at a show.’ I think the last thing that happened was that the principal researcher on that ended up in a small factory in Bayswater by himself busily trying to make it all happen while he slowly crumbled. That was the end result of about \$7 million worth of research. When I read these documents about these things, what happens is that everyone cherry-picks. They say: ‘Look, there’s a nuclear source, there’s Cochlear. Wasn’t that marvellous?’ But they forget to mention all the ones that did not work.

A much more sensible way, and the way a normal company would function, is to look at the whole lot. You add up the positives and you add up the negatives and you say, ‘Well, how is our balance sheet?’ That is not being done. Cherry-picking is what is going on, and it is the cherry-picking which is probably even worse than this process of counting papers. In many ways in industry you do not want papers on really new things because all you do is stop the patents. You are better off shutting up.

Mr QUICK—You mentioned at the end that foreign strategy is relevant to Australia and our decision to—

Mr Grey—You have got to remember that I sell in 110 countries. I have personally visited most of them probably six times, and I am very sensitive to what goes on. I have friends all over the world in all sorts of places. At the end of the day, when we run around talking about assaulting other nations and things, it is not a good look. My friends say, ‘What’s with you guys?’ It is not good for trade.

Mr O’Loghlen—I would add to that. Our major markets are Asia, the Middle East and South America. We have won contracts on the basis of price in South America for scientific instrumentation. Those contracts have subsequently been cancelled because Australia refuses to join the IADB—that is, the Inter-American Development Bank. Both the Labor and Liberal governments have consecutively refused to join on the basis that we cannot afford it. It is a major drawback to our market in South America. We had a contract with the Brazilian education department for something like \$700,000 worth of equipment, which was summarily cancelled because Australia was not a member of the IADB. We had won the tender process but the contract was cancelled because of that non-membership. In the Middle East and Asia, since the more recent events, there is no doubt that Australia, as a nation which was independent of the United States, had a better marketing chance than it currently does—full stop, end of quote.

Mr JENKINS—I want to clarify the commercial relationship over the MFR licence with CSIRO for the Wollongong mass spectrometer.

Mr Grey—That was a case where we started off with a licence, but the technology subsequently changed so much that the basic pattern they had was invalidated. I was talking with my lawyer and he said: ‘Why are you pushing on with this? You don’t need this. Just send them a letter saying no thanks and continue,’ so I did. Effectively, the original thing they were licensing had no IP—the IP was invalidated. We had new IP, and there is no point in sharing something when you do not need to—business is business—and so we pressed on. That probably did not generate a lot of goodwill but, as I said, business is business.

Mr JENKINS—So did Wollongong buy any of your products?

Mr Grey—They may or may not have. I really do not mind because 95 per cent of my business is out of this country, so what happens here is not really very relevant.

Mr JENKINS—As a company how many patents do you hold?

Mr Grey—Perhaps 20.

Mr JENKINS—What have been the difficulties globally in the protection of those patents?

Mr Grey—We have had no problem at all. There is a totally usable system. The only problem I really have is with CSIRO, because we have to pay for their patent protection for the MFR. That is part of our deal with CSIRO. They patent in every single place in the world. We have a far more practical approach to patenting. We patent in Japan, Germany, USA, UK and France—nowhere else. The fact of the matter is that, for most of this sort of stuff, if you have blocked it in the USA you have blocked it enough to make it noneconomical. The CSIRO way costs about two or three times as much per annum for patent costs on a product than our way. That is

because we are a private organisation and, at the end of the day, I get my dividend from the profit, so why waste it?

CHAIR—So they did a good deal when they made you block everything.

Mr Grey—They did not do a good deal; that is just their standard deal. Let's face it: they waste money because they have got plenty.

Mr O'Loghlen—We support the concept of the CSIRO and those sorts of organisations, undoubtedly, but when it comes to the business side I am afraid there is a difference.

Mr JENKINS—I think you said there are strategic reasons for covering France, Germany and the UK. Does the European Community not have a reciprocal arrangement?

Mr Grey—Yes, there is, and sometimes we do that. It depends on the product and it depends on where our competitors are. Japan is another that we have to look at. We have a look around to see where our competitors in this area are. Firstly, if we patent in their home market they cannot make it in their factories. It is a very good protection—but not so good now because they might make it in China.

Mr JENKINS—Which leads to the sort of support that you got from the Malaysian government to set up your Malaysian operations, which is not available for your Australian operations.

Mr Grey—There are a whole lot of things. The key thing with Malaysia is that, first of all, it is strategic. We have had some problems, and having had some problems we want to be in a position where we have opportunities. So we now have another manufacturing plant.

A bigger thing is that we have been trying for a long time to reduce our cost to goods. All our competitors are starting to manufacture in China, and it is very clear that if we do not do something about it we will become a bit of history ourselves. So we have to reduce our costs. I do not like China—it is too far away, it is a bit tricky and you do not know what the rules are and when they may change. Malaysia is only eight hours away. Malaysia has an electronics industry, but Australia does not. For instance, the capacitors that we currently buy out of Melbourne—of course none of them are made in Australia—are made in a factory two blocks from our Malaysian operation. The managing director, a nice Chinese guy, walked round with our samples in a cardboard carton and said, 'Here you are.' The price? One-fifth of the price we can buy them for in Melbourne. He said, 'I send these off to the United States, where they get labelled, and then they get sent back to Australia.'

Therefore, the first thing we have to do if we are to compete in the long term with companies manufacturing their products in China, for instance, is to be able to buy our components at a real market rate—that is, 20 per cent of the price for which you will buy them wholesale in Melbourne. That is the key thing for us. We will now be importing all our components from Malaysia. That will mean a couple of million dollars that we do not spend in Melbourne, but it will pull our costs down and enable us to continue. It will enable us to compete with Chinese manufactured goods.

Mr JENKINS—At the moment, what effect on the Dandenong plant has there been with the opening of the Malaysian—

Mr Grey—None at all. I have good people and I have known them for years. We are a family company. Amongst the people, I am Uncle Ron and the operations manager is mum. I am not going to sack my people, but I do have to provide lower cost components. As I see it, all of my products that have been around for a while—and I am going to compete within China—will go to Malaysia. I can still make the newer products with the higher margin here, and if I can I will, but I am certainly not going to miss an opportunity and drop a product simply because if I do not make it in Melbourne I cannot compete.

Mr O'Loghlen—I would add that at the moment we see the future of the manufacturing industry in Australia as being at a major crisis point, primarily because of the usurpation of the consumers' approach to markets. We now have retailers. If you look at the financial markets, you will see the leaders of the financial markets and the finance industry itself are predominantly retailers and resource industries. The resource industries are now almost 100 per cent foreign owned—full stop, end of quote. They have stopped local manufacture or value adding in Australia predominantly. As far as retailers having access to world wide markets is concerned, go into your local supermarket and buy cashew nuts and peanuts from Vietnam, by all means—support an Australian company that is buying foreign products very deliberately. The benefits of the cheaper prices they are getting are not being passed on to the so-called consumers; they are being absorbed by the retail industries themselves.

If you analyse the expansion rate of retailers, they have been expanding at four per cent over the last couple of years and the minor players, the smaller ones, have been increasing at 0.5 per cent. The concept of globalisation has been taken and, if I could use the term, bastardised to the detriment of the consumer market. You will find that manufacturing will be forced out of business, particularly when the automotive industry generates its new models next year. Most of those contracts have already been signed overseas. An Australian manufacturer will be in a real sorry position in mid-2006. The consumer will then not have the income necessary to pay for the new imported consumer goods. Basically, economics is not a science, which is an unfortunate reality, but economics has a major influence on our political decisions and it is not a healthy device.

CHAIR—I come back and pursue the issue of patent protection. Could you compare the coverage you have to get with respect to your agreement with CSIRO with the coverage you get when you are protecting yourself?

Mr Grey—CSIRO have a policy of protecting every possible place. I guess that is what their lawyers, and certainly their patent attorneys, have advised them. We have a process whereby we try and get an adequate level of protection for the minimum cost. If I figure that I can protect it in just a couple of key markets, that is sufficient to stop it being a usable thing.

CHAIR—And if you were making the decision for CSIRO, would you take your course, their course or split the difference?

Mr Grey—I would take mine. It saves a bit of money. We are not talking about a major thing. It is a small thing but it saves us maybe \$20,000 a year. Twenty thousand dollars is \$20,000.

Mr O’Loghlen—It is no loss to the CSIRO. They charge their legal costs to us.

CHAIR—I am interested in the larger point rather than the—

Mr Grey—It is not a major issue; it is a minor issue.

CHAIR—Thank you very much. Do you have anything that you would like to cover or that you wanted to raise but have not been able to?

Mr Grey—I think our submission was fairly comprehensive. We spent a lot of time on it.

Mr O’Loghlen—I will make one ad for Mr Quick. There is a real problem in terms of people going into the hard disciplines through tertiary institutions. My personal belief is that in secondary school they are taught: you do not have to do subjects that you do not enjoy.

Mr QUICK—I have noted that. I have it underlined.

CHAIR—Thank you very much. We are grateful.

Evidence was then taken in camera but later resumed in public—

[2.36 pm]

SCHNEPF, Mr Kurt Edmund, Director, KCS Pty Ltd

CHAIR—Welcome. I should advise you that the committee does not require you to give evidence under oath, but this is a proceeding of the parliament and any misleading or wrong statements could be subject to parliamentary action for breach of privilege. Would you like to make an opening statement?

Mr Schnepf—I have no intention to mislead anybody.

CHAIR—That is a standard statement.

Mr Schnepf—My memory is not good enough to remember what I said yesterday!

CHAIR—You are only going to be here for half an hour.

Mr Schnepf—Thank you for the opportunity to introduce myself and inform the committee about KCS Pty Ltd. KCS is a family-owned business in Lilydale that started in 1981. Our business is all about creating unique solutions with plastic. KCS is small in size but it has, and is continuing to develop, a national and international reputation as a leading innovative injection moulder and plastic product manufacturer. Our business provides answers for Gillette, BHP, McDonald's, Clipsal, Fasco, Kookaburra Sport, Scholl's podiatry products, Invatec biomedical supplies, Norwood Abbey medical supplies, Glaxo medical devices, Acrux medical devices and Bristol Squibb devices.

Recently, we successfully completed a project for Swinburne University. Prior to that, two representatives from the university came to KCS and, during our meeting, they asked why we believed we could do what they wanted when the rest of the world was unable to do it. I simply replied, 'We are just smarter.' Not only did we deliver but we also delivered at a much cheaper price than indicated elsewhere. I still have problems with the English language, but you will get what I am saying. We not only received a prize for our efforts but Swinburne University also wrote a wonderful letter in appreciation of what we did for them.

Our unique processes and techniques enabled KCS to win against Chinese competition in the US market. The advantage of our knowledge gives us a small window of opportunity in a very difficult and competitive market. We believe we are leaders in the development of injection-moulding techniques to process super-soft plastics. We are unaware of any other moulder able to produce products with a shore hardness down to three shore, which is super soft. I am very conscious that Scholl or Gillette could find another supplier who could do what we have achieved. They would do what they could to reduce their sole dependency on an Australian supplier, particularly for their European market.

Our turnover and employment has doubled in the last five years due to our continuous efforts in R&D. In relation to that, the amount of money KCS has returned to the government through additional company and income tax payments would make the R&D tax concession appear as a

ridiculously low figure. Our gross income through innovation has also increased our costs and we have had to employ an additional staff member just to meet government red tape. That additional staff member is a resource I would prefer to be dedicated to the development of the business, as I do not have the luxury of a dedicated R&D team and we have to absorb our R&D costs within our production costs.

Within Victoria, we have a basis to grow to a substantial global business. Together with our Dandenong based raw material supplier, we have satisfied the expectation of some extremely difficult customers. We would like to see the intellectual property we have developed utilised for the benefit of Australia. I know that KCS is in the global forefront of tooling and moulding techniques. Being at the leading edge of technology requires significant investment that does not allow me the resources to promote our capabilities and successes and really grow the business in the market niches that KCS would like to fill.

I will now list the strengths of KCS. The first is the ability to tap into a pool of knowledge of skilled and experienced staff—for example, our tool room boasts over 200 years of experience in solving complex tooling projects, if you put all of the experiences together. The second strength is our investment in high-quality specialist equipment—KCS owns the largest automatic injection moulder in Australia. The third strength is the communication and exchange of ideas internally and with our clients and the fourth is flexibility and quick response to customer requirements. The fourth is the combined integration of tooling and moulding skills and the sixth is commitment to R&D—for the last 10 years, we have spent on average 10 per cent of our yearly turnover on it. The seventh strength is our ability to offer customers complete turnkey solutions, recognising our strengths and utilising the best external expertise. Thank you for the opportunity to address the committee. I would like to invite members of the committee to visit our operations in Lilydale. I am now ready for your questions.

CHAIR—Thank you very much. For the totally ignorant, could you tell me about soft plastics?

Mr Schnepf—Soft plastics are thermoplastic elastomers, which are very soft. They are replacing PVCs and silicons. They are really soft.

CHAIR—Is that when they go in or when they come out?

Mr Schnepf—When they come out of the moulding machine they remain soft. They have various hardness levels. A table plate is about 80 shore. We produce components that go into shoes for people with problems between their toes or whatever. That plastic is so soft you hardly feel it in between your toes. It keeps the toes apart and makes you feel good. We do a whole range for Scholl. When you go into the supermarket, you would find all the Scholl products, but a lot of them come from other countries and they are of far inferior quality to what we produce. We export to Scholl in England. In England, those components, for price reasons, are sent to India for packing and then they are distributed in Europe. We have a real leading edge because there is nobody in Australia who has been able to copy this technology—and there have been people who have tried.

CHAIR—Did you develop this technology yourself?

Mr Schnepf—We developed it after we saw there was a market for certain products. We were looking at the health industry. There are certainly products which require very soft plastics—even such as products to go on corners so children do not hurt their heads. We have a whole range of ideas, but everything is related to money and the availability of money. We are a company that operates a little differently to most others. We operate debt free. We own everything. We buy it when we can afford it. That is probably also a plus for us.

Mr JENKINS—Back in 1986 when you started, what were you making—what were you doing?

Mr Schnepf—Moulding tools, press tools, anything I could get my hands on. I am a professional toolmaker. I have a degree in design and engineering from Germany. On coming to Australia my papers were not recognised, but I made an effort and started my own business after managing other people's affairs. When I saw that I could do better than them, I started with my wife—I taught her how to do some work and after she was better than me I employed people. As I said, in the last five years we have not just doubled our turnover but also doubled the employment of people. We consider ourselves a very smart little operation.

Mr JENKINS—So, back then, what materials were you using?

Mr Schnepf—Nonexistent.

Mr JENKINS—And when you developed these new TPEs?

Mr Schnepf—I am not a chemist, so I asked the help of raw material suppliers. I work very closely with Martogg. They are a raw materials supplier in Dandenong. I told them what I had in mind to do and asked whether they could formulate certain materials to behave as I wanted them to, and together we achieved a really good result.

Mr JENKINS—So you actually went in search of a pliable plastic?

Mr Schnepf—Yes.

Mr JENKINS—So you had that notion, and then you developed the TPE to whatever it is—Shore A3?

Mr Schnepf—From 3 to 7—that is the criterion where a lot of people have problems in processing it. There is none to my knowledge which goes under 15, but we can go down and make a product which is 3 Shore hard. It is like a foam rubber.

Mr JENKINS—So at what stage did you match this up with a practical product for the market?

Mr Schnepf—I was also working with a design office, Bayly Design, and I asked them whether they would be able to connect me with Scholl and Gillette, because we were already, for a long time, manufacturers of disposable shavers for Gillette. You have probably seen on television the Blue gel response which they advertise. That is made completely in our factory. We could do the first complete overmould of soft plastic onto a plastic handle. Based on that

experience, Scholl and Gillette gave us a shot at their footwear, and from that moment on we never looked back.

Mr JENKINS—So you had a commercial relationship making products based on old technology?

Mr Schnepf—Yes.

Mr JENKINS—And the story was that you then thought, ‘Why can’t we make these more pliable plastics?’ and then, with the commercial relationship that you had with Gillette and Scholl, they then developed a variation of their product?

Mr Schnepf—They let me have a go at some of their products. But it originated about 15 years ago when Kookaburra Sport approached me to build a machine. They have the leather half-moons for cricket balls and they stitch them together. They put a cork piece inside, and that is woven with some cloth around it. They said it was a very costly process and asked whether I could help them to simplify that. So at that time we looked at flexible PVC, and this was the first—but PVC is basically a no-no for most people these days, because it has a few nasty ingredients in it. So we went to various different materials and we came up with some very good solutions for the cricket balls and they are still manufactured now, after 15 years.

Mr JENKINS—What Shore rating is that?

Mr Schnepf—That would be about 40.

Mr JENKINS—That makes a good dent in your skull if you get hit!

Mr Schnepf—We are the maker of the golf grip which is called ‘The Perfect Grip’. You have probably seen it. They put it on the end of a golf club, and it is made out of various materials moulded together. This is also a field which we are specialising in: having harder materials combined with softer and also with metal in contact. It might sound very simple when I say it, but we spent a year to complete a certain process. But now we benefit from it.

Mr JENKINS—So in that case did the handle people come to you?

Mr Schnepf—Yes, they came to me after they had had a major failure with a Queensland company. They asked me whether I would have a go at it. I said, ‘You’ve got some samples here; whatever they can do, I can do better.’ And I did. I sold probably 40 container loads of those handles to America. Then there were some advertising problems—not with me but with some other parties—and the orders died.

Mr JENKINS—When these people approach you, do they fund your development, do you share the risk or do you have the whole risk?

Mr Schnepf—After I prove it can be done, then they talk about money—but not before.

Mr JENKINS—So you shoulder the whole risk and fund it?

Mr Schnepf—That is exactly what it is. I can only do so because I have a successful moulding company running parallel to the tool room. I also have a plant where we do profiles for BHP. All the steel rolls these days have to have a protective edge on them. We manufacture that. We had competition, which was Nylex, and I think Nylex gave BHP incredible difficulties in their supply.

Dr JENSEN—Was there any stage during your business history where you felt that you could have done with some government assistance or any way in which maybe legal or tax processes could have assisted your business?

Mr Schnepf—Outside help can always help, but I was not really aware of what was available. I employ at the moment a very knowledgeable person who helps me to look into those things, and there is real value in it. But if you look at it and think, ‘I can make money out of R&D,’ there is no such thing. It is absolutely impossible. If I did not have an operation to finance all my other projects, the R&D would be just miserly—almost nonexistent in comparison with what you really have to spend to get a project off the ground. When you look at new projects, if there are 100 inventors, probably one makes headlines. The same thing applies to me.

I have had lots of failures as well. There is one which I really regret. I was one of the very early persons who put a patent on a smoke detector—a smoke detector which was incorporated in the ceiling rose in the middle of the room, where the light is. That was in 1984 and everyone said, ‘We don’t need it.’ I paid for the patent for 16 years and now everybody wants it. But that was so much smarter than what they have today because already then that smoke detector had a dual function. It sensed with infrared and radiation and it had a radiofrequency on the circuit board where it gave a signal to four rooms. I had a little warning block that said ‘bedroom 1, 2, 3 and 4’ . If the house is on fire, you do not open the door where the light is on because if you open it the fire might kill you. Nothing like that has been produced since.

Dr JENSEN—You have highlighted one example where I guess you led the market and therefore you had a bit of a problem. Can you highlight an example—I guess it is a bit of a difficult one because your company does not seem to have too many failures—

Mr Schnepf—I have failures too.

Dr JENSEN—Can you give us an example of a failure that you had where perhaps a different legislative or tax framework or some different mechanism between you and, let us say, a university, could have assisted you so that that would not have ended up being a failure?

Mr Schnepf—Most people who come to me have an idea but they do not really know how to go about it. I just recently solved a big problem for Swinburne University of Technology. They had searches done all over the world for some super-small componentry. I was basically in front of their door, and we solved it in the time frame. They sent me a letter; I have the letter here. When we tackle something, we analyse it and see whether we think we can do it. If I have the feeling that something can be done then I persevere for a long time. I am not a person who gives up easily. If somebody comes to me with something which comes from another country and says, ‘Can you do that?’ my answer is always: ‘What they can do I can do probably better.’ I stick to that.

I will tell you about another failure, if you want to hear about failures. In the eighties I was experimenting with water filters. Now everybody has water filters. I still have the prototypes. My water filter has a different device in it: if the filter is blocked, the flow of water pushes a red pin up and you know that that filter needs to be replaced. They all have very simple filters today but nobody knows when they are blocked and are growing bacteria.

CHAIR—There is a market opportunity.

Mr Schnepf—The Board of Works killed that thing. They said: ‘Our water is clean. We do not need this.’

CHAIR—And you believed them!

Mr JENKINS—I want to ask about the difficulties of patenting.

Mr Schnepf—I own a number of patents and I tell you straight out: if you do not have a million dollars to defend them they are not worth the paper they are written on.

Mr JENKINS—So achieving the patent is not the problem; it is really about your ability to protect yourself once you have it.

Mr Schnepf—Yes. I have a patent in America for a safety item which goes on steel bars. It is a plastic cap which has flexible rings. I have been under attack quite a number of times on that patent. Like I said, if I had millions of dollars to defend it that would be the strength of the patent. I have about 10 patents. Some of them have made good money and some of them have just been a nuisance.

Mr JENKINS—I am not trying to lead you, but what you are really saying is that we might say, ‘Could government assist you with protection?’ but that really a very high level of resource would be required.

Mr Schnepf—The government certainly can help me by opening some doors. I would like to work in all the new fields of medical science, but for a small company like mine it is very hard to get into those fields. If people would open doors for me, that would certainly be a help. I work with a lot of medical companies. Just this week I was approached by a German company, Bayer. They want me to build special machines for making tablets, for a very special reason. They have been manufacturing that type of equipment in Europe already for many years. But because I am in an isolated place they know that their knowledge will not escape before it hits the market, so I have an attraction. Being in Lilydale I do not have many people coming in.

Mr JENKINS—But you have to be registered once you go into those sorts of fields.

Mr Schnepf—Yes. We are in the final phase of the second quality certification, which is for the European side. All the companies have audited me so far. Companies like Glaxo bring in their internal auditors and audit us; they do not trust anybody else. Since we are selling into the European market we have to have the European QC standard. We are just about ready to be audited on that one too.

Mr JENKINS—Is that a costly process for you?

Mr Schnepf—Yes. It will definitely be an enormous cost. You should see the paperwork involved in being certified. Then there is all the tracking that you have to do to be able to trace something. If somebody has a question three years later about where some material came from and why it is deteriorating, you must be able to give all these facts. It is very costly. I had to employ another person to do that.

Mr QUICK—Where do you see the future of the business? Do you see it expanding five per cent every year?

Mr Schnepf—Due to the soft plastics, I had a very rapid expansion of the business. I would say we always had about a 10 per cent increase of our business activity, and in the last couple of years we were doing better. I visit a lot of exhibitions and I keep myself constantly up to date with what the latest is in other countries. I have a very good understanding of how the Chinese market operates—I have been over there; I lived with them—and I know exactly how dangerous they are going to be, in the long run, for all the businesses that are not doing what I do, namely, informing myself and staying five years ahead of them.

CHAIR—Thank you very much. That was very interesting.

Proceedings suspended from 3.01 pm to 3.07 pm

SAUNDERS, Dr Elaine, Chief Executive Officer, Dynamic Hearing Pty Ltd

CHAIR—Welcome. Thank you for coming. Would you like to make a brief statement to open.

Dr Saunders—I was not sure of the best way to proceed; I thought I would tell you a little bit about our organisation. Firstly, thank you very much for inviting me to participate. I have read a number of the submissions that were put in by very distinguished academics and public figures. I have spent the last five years living the start-up process and I thought the most useful way that I could contribute would be to share with you a little of the path we have travelled and what we have learnt in the process.

Dynamic Hearing is a spin-off from the CRC for Cochlear Implant and Hearing Aid Innovation. Our core technology was invented by Professor Peter Blamey, who was at that time employed by the University of Melbourne but was an NHMRC fellow. He had patented many inventions in the previous 10 years, mostly in the speech-processing field for cochlear implants. At the time that he invented the ADRO technique for processing sound, he was employed by the University of Melbourne and a percentage of his time was allocated to the CRC.

ADRO is a new signal-processing technology that completely revolutionises the way we hear sound, especially in noisy conditions, through hearing aids, through headsets and, potentially, through mobile phones. It is also suitable for use in cochlear implants. The technology was actually passed to Cochlear, prior to its commercialisation through Dynamic Hearing, for use for electrical stimulation in cochlear implants. That was through existing agreements.

Peter and his team knew that ADRO was an absolutely revolutionary step forward in signal processing, especially for hearing aids. So we sought a business model to commercialise the technology for acoustic applications. We determined that the best opportunity lay in using software as the delivery model and licensing solutions to hearing aid manufacturers and other players in communication device industries. Most modern digital hearing aids have tiny computer chips in them. They are about as powerful as the PC you were using 10 years ago. I brought one along that you might want to have a look at. There is a tiny chip in it. They were just becoming available in 2000, which was the year we wrote our first business plan. At that point we established a good relationship with a manufacturer who was then the only provider of those chips. We have to run on a very low current which is very specialised because the battery is also very small.

We developed a business model where we would implement and license the code for ADRO processing and other technologies on those tiny chips to manufacturers. We knew from the start that all of our potential customers were overseas. There are really no significant manufacturers with headquarters in Australia. We planned a non-exclusive licensing model with a delivery model that we believed would reduce barriers to entry to the manufacturers. The alternative path for any such IP situation really would have been a one-off licensing deal to a hearing aid manufacturer—a situation which, I should say, the hearing aid industry like and are well used to because they get very cheap deals. We plan to be a very successful licensing company and we believe that the return to Australia will be many times the revenue that would have been

achieved with a one-off licensing deal of that kind. This way Australia gets a much bigger proportion of the realised value of the IP.

Five years on, Dynamic Hearing is well on its way to commercial success. We have signed technology licences with four international hearing aid companies and our technology is already available on four continents. We have licensed to a Canadian DSP chip manufacturer which has a good reputation in the hearing aid industry. Our technology is ready loaded on the chip and will be on sold to hearing aid companies. In order to maximise the potential from our technology we thought we would go into multiple verticals. We hope to go into three different vertical markets. We have already licensed a new technology based on the original to a major leading US headset manufacturer for what is called a headset amplifier. This technology provides hearing protection for people in call centres by protecting them against loud shrieks on the phone line. Our technology also provides them with very much better clarity for speech in the noisy background of a call centre than anything else that is on the market. It is way better. We are also in the process of negotiating commercial terms for our technology to go into Bluetooth headsets. We have done it and we are working on the commercial deals. As a benchmark we reckon there will be 80 million Bluetooth headsets on the market next year.

Dynamic Hearing now has a team of 18 talented staff and we are currently recruiting. We provide an environment that stimulates teamwork, creativity and innovation. I believe we bring the best of our heritage into a very fast-track engineering and development environment combining knowledge of hearing science and evaluation with very rapid ICT development so that we can provide a modular suite of software applications to our growing customer base. At this point we can provide a complete solution for a customer. They can drop it into their products in much the same way as you would buy your software for your computer. That is in comparison with the previous delivery and product development time for a hearing aid manufacturer of about two years for an ASIC.

The company business model is ideally suited to fast tracking and value adding to university research in the international markets. We have actually formed an alliance with a major research centre in the US for this purpose. We have found that the US research institutions seem to be more aware of the commercial advantage of non-exclusive licensing in this kind of value-added way to make IP available to multiple customers. My submission highlights some key factors that got us to this point. My guiding thread is that what we required for a spin-off company to succeed was a combination of money, the right people and flexible IP management.

Our story gained a lot of momentum when we entered our business plan in the 2000 Melbourne Business School Entrepreneurs Challenge. I wanted to draw that out because it provides a lot of free help and guidance. It has a lot of energy and brings in some very experienced business people. It gave us exposure to the venture capital community. We raised venture capital of \$5 million in two capital raisings over the first three years. This did include money from the Australian investment funds. Our initial capital was used to fund a clinical trial, after which we licensed to our first customers. I should say that the investors have aligned with us in the development of a very fast-paced company.

We have developed a number of other patents. Our business model has evolved to supply manufacturers with a complete audio solution on a chip. So we went from a standing start to being able to provide to manufacturers the world's most advanced hearing aid solutions, and we

have just replicated that in headsets. Where were our key challenges? In my view, cash is king. We were successful in gaining investment, but we would not be in the position that we are today without the AusIndustry grant funding that we received. The AusIndustry grant funding has been fantastic. To maximise the return to Australia, we need to be in several vertical markets and we need to keep ahead of the game. The AusIndustry funding we gained was from an R&D Start grant and from a BIF grant. That took us successfully into the headset market and extended our product suite in the hearing aid market. We are hopeful of being able to do the same in the phone market if we are successful with one more application.

The R&D that we have done outside the university, I have to say, was at least as valuable as the R&D that was done within it. The grants have been very valuable, because we are a technology and licensing development company and most of our revenues are ahead of us. We are taking revenues, but our customers take quite a lot of time to launch a product, to get their marketing story right, to put it in the right place and to get their product pipeline and so on. We could not have funded the development that we did without grant funding in the time window that we did it in. We would have slipped behind the rest of the world. Instead, we stayed ahead. We are at a stage now where we are putting every available dollar back into development. We are building a stable base and we are entering multiple markets. The grant allowed us to build a team at twice the speed we could otherwise have done. We also benefited, of course, from the R&D tax concession.

The AusIndustry grants had three key benefits. We were able to demonstrate to our customers that we were not a soon-to-disappear start-up company. We were there at the trade show, the next year's trade show and the one after. We have built a solid technology team that has impressed with our delivery times and our professionalism. It has also put us in a better position for negotiating deals. We have impressed with the speed of our development and we have demonstrated to customers that we have the backing of the government. When you are taking a company overseas, that does impress—it carries weight. We always tell people. It instils confidence in a new company. So I solidly endorse the AusIndustry grants program.

Similar arguments can be made on the marketing side. The critical issue for us with an export market was to get known, to build relationships and to build confidence with our customers. In a technology sale, which is usually quite a slow cycle and may involve many people, there are repeated visits to the customer. I spend about 4½ months overseas on trips. Eight of our 18 staff have spent significant amounts of time travelling backwards and forwards. It is a very high priority and I could not underline strongly enough how important it is to be with the customer and to have that help in those first few years in establishing that relationship.

Money is clearly important. It clearly needs to be in the right hands. I read a lot of the submissions. I did not read an awful lot about the people involved. We have surrounded ourselves with as much commercial expertise, knowledge and good advisers that we can muster—and there is a depth of it in Australia. We have applied ourselves to learning fast and to being nimble, but I think that commercialisation via the start-up path absolutely must have the commitment and the buy-in from the entrepreneurs who are prepared to absolutely give their lives and work to drive it to success. I encourage the committee to back the methods that give sufficient backing to the right people as early as possible in the process.

The third benefit I would draw out is flexibility in IP to make things as straightforward as possible for the commercialisation process. It seems to me that most of the issues that get in the way may often be to do with IP ownership issues. The more straightforward it is, the better the return for the country. I am very pleased that this inquiry has commenced and that you are conducting the hearings. I hope that our experience can contribute to it.

CHAIR—Just to begin, one of the purposes of this committee was to get successful innovators and ask them how they could have been more successful. One of the dilemmas that the committee has faced is that every successful innovator did not have any problems. I am not sure that we have had one of them say, ‘We could have done it better if we had done A, B and C differently.’ Could you have done it better if you had done anything differently?

Dr Saunders—Yes. The early stages of getting the company out of the CRC were not very easy. It was a slow process, which concerned us because of the time; technology is a race. So, yes, that could have been better.

CHAIR—Could you tell us a little more about that?

Dr Saunders—CRCs frequently have very complex IP paths. I think if one was to nail it down to one issue, that was probably it.

CHAIR—What did that involve? We are not experts. How did the IP impede your liberation onto the market? What negotiations were involved?

Dr Saunders—CRCs are all comprised of a number of parties. I imagine all of them have situations where there are potentially multiple stakeholders. What you need to have in a start-up is to have a very clean situation so you can simply do the process quickly. That is probably all I want to say about that, I think.

Mr QUICK—Do you still have links with the CRC?

Dr Saunders—Yes, we do. I should perhaps give my own background. I was involved in the CRC for Cochlear Implant and Hearing Aid Innovation for several years where I worked very intensely and closely with Cochlear on a design project which had a very successful outcome. I then moved into a commercialisation role, which is where I met the inventor of the ADRO technology. It was my first major commercialisation assignment. We commercialised our way out. We felt that setting up a company of this kind was the best way to do it because the environment was right. The availability of the technology and the changes in the technology environment were right for this path. It would not have been the right model three years earlier. I have worked on both sides. The CRC is still a stakeholder in the company. They have a small shareholding and the director of the CRC is on our board.

Mr QUICK—What is the cost of protecting your IP in the international arena?

Dr Saunders—We are in a fortunate position with one of our patents. Because of the path I described to you, we actually share our core starting patent. The ADRO patent—the one which was the CRC’s investment in the company for which they gained a shareholding—is co-managed with Cochlear. We now have a suite of patents that we have developed ourselves and

we put a sizeable portion of our revenue and development into protection of that IP, and from the start you can put some of the grant money into that. I believe we have a very rigorously planned patent protection that is software IP.

Do you want another war story? Our first customer overexpanded and went into liquidation. We certainly had a hurdle because it is a bit tough when you invest in that company and you have to turn around to your investors and say, 'Our first customer has just gone under.' You have to want to win. You absolutely have to want to win to start a company, I think.

Mr QUICK—At what stage is the international recognition that here is this little company in Australia that has world leading technology and a low investor fund compared to some of the other big players. You are really the leader out there in the international market. How hard is that to push when you are wandering around trade fairs in Leipzig and Seattle and so on?

Dr Saunders—What is Leipzig?

Mr QUICK—Here is this little company in Victoria that no-one has ever heard of.

Dr Saunders—To be honest, in the first year we went out I do not suppose anyone ever expected to see us again. We do have very good technology and I think we have made the right call in our technology development. Initially when we set out we knew we needed to make it easier for the customers. I do not think we realised right at the start that we needed to have such a complex product. We have developed all the software in this little hearing aid that I have here, which has got multiple processing schemes in it—the amplification scheme, a special beam forming microphone and something that stops the whistling—because we realised that multiple products would allow us to have a lower barrier to entry. We could say to the manufacturer: 'Don't worry about mixing it with your product. You can drop this straight in and you can choose—just like with your Microsoft suite—the modules that you want. You can have the microphone, you can have access.'

Dr JENSEN—So with beam forming, you obviously have multiple microphones.

Dr Saunders—Yes, that is right.

Dr JENSEN—I am quite interested in the technology but I do not think this is the appropriate forum for it.

Dr Saunders—We have a mix-and-match modular formula but we can mix with other people. To answer your question, we had to learn exactly what the customer wanted. There is a little black hood under there and the computer chip is under that. It is that small.

Dr JENSEN—Have you thought about submarine sonar for some of this?

Dr Saunders—There are a couple of things that have been suggested. We have a good chairman. As I said, good advisers are very important. We have a chairman who has had industry experience and has grown the company himself. He has got the enthusiasm to back a technology company of this kind. Perhaps one of his earliest bits of advice was: 'Get out there and get to know those customers and find out what they want.' Our first approach to the customers was

really: ‘What exactly do you want?’ The next year we went back with the product. We have done that several times now. We have gone maybe with an audio demonstration or even a suggestion of what our capability is and we have gone back with a product in the time frame that we said we would. So I think that what has been most important in getting there next year is actually having that finance to help before the revenues come through and hitting those deadlines—basically acting in a very professional way.

Communication has been important too. We have really put a lot of thought into how to communicate our technology. We put a very Australian flavour in it. Australian hearing technology has a lot of cachet overseas even though we do not have hearing aid companies here. So we have really taken that through. But we have put a lot of thought into innovative ways of actually communicating our product, not just into the product.

CHAIR—Can you tell us a little more about the advantages of exclusive, as against non-exclusive, licensing?

Dr Saunders—I think that exclusive licensing is only good if you have a deal that is going to reflect the potential value of the technology. We have taken some IP which could have been licensed one-off to a hearing aid company. The hearing aid companies, and I imagine many other technology companies, buy a lot of university IP from around the world. They get some very competitive prices for it because there is not usually much commercial ability to negotiate. We have built a product and a brand. We are trying to drive market pull so that multiple people want our product. There is an up-front cost, obviously, in developing that. We want people to look for ADRO. We want them to say, ‘Has your hearing aid got ADRO in it?’ or, ‘Has your headset got ADRO in it?’ If you have got the time to build that brand then you have the potential, clearly, to have revenues that could be many times in excess of the quarter of a million dollar licensing deal to one hearing aid company.

Mr JENKINS—You talked about working on both sides. What did you originally train as?

Dr Saunders—I’m a bit of a mixed bag. I have a rather unconventional career path. I am a physicist by my very first training. I do have an English qualification as a master of audiological science. I have got a PhD in physics and audiology. I have a graduate diploma in business studies.

Mr JENKINS—So at what stage did you develop your commercial bent? We have had a discussion during the day about this, so I am interested to know.

Dr Saunders—I have thought quite a lot about this. I think every career role I have ever had has really in its way been a bit of a start-up. My first job was actually in the British National Health Service as a new graduate of 22 looking after the technical needs of 22 hospitals, which was incredibly daunting and I really had no idea of what to do. I realised that the way to everyone’s heart was through technology, and I started at the first commercial calibration service that the health service had ever had. That was before privatisation. It is actually still running. That was a quite long time ago. Most roles I have had have been start-up roles of one kind or another, even though they have been quite diverse. They have been in academia—I have been a university lecturer—and I ran a small business when my children were little—I have four children. For me the CRC was a good place because I was able to bridge things. I worked very

closely with Cochlear. I was not their employee but I could work right across the bounds of the staff teams. So I have really got a quite mixed background but I think what has been common to everything I have done is that I like driving new projects somewhere. For five years we have been starting a company. I think running and building a company is just about the most satisfying thing you can do as an entrepreneur. So I think that out there probably across all your different environments and all your different groups—your universities, your hospitals and your private industry—there are individuals in all those groups who are what they are and entrepreneurs as well.

Mr JENKINS—So you are emphasising that the environments that you have found yourself in have helped that innate thing?

Dr Saunders—I have been in very different environments and I think I have driven change and process. When I went to work at the Bionic Ear Institute, I was fortunate in that I was given quite a lot of freedom. That suited my entrepreneurial spirit. I think that when you back business you are backing people who have got drive to make change and to build, people who are prepared to learn and listen and to work within that environment. In a way we went out to change a rather stodgy industry. We were determined to do that, so we have had to use all the native wit and intelligence that we have as to what is right for the environment that we are in.

Mr JENKINS—There was a suggestion about a debate as to whether or not there is a supply of enough people that have got that entrepreneurial spirit and some understanding of the various fields across what we are looking at and as to what they need, as they find themselves at different stages of their career—from their education and training through to their working life—that will help them to be able to develop to the fullest.

Dr Saunders—Being unafraid to try new things and to take that step to work in different environments—I am sure that has helped me. I have worked in a variety of different environments. I have worked in different countries. I have worked in universities, hospitals and private enterprise, and I have learned every time; you always learn. I guess it is about giving people the knowledge that it is a good thing to experiment.

I noticed that one of your submissions started with a kind of cradle view. I think someone wrote about encouraging innovation at an early stage. I think that certainly at school and university it is probably a really good thing to actually have that ability to experiment, think and drive forward. I like my staff to think. I am the custodian of 18 very creative people and my role is to keep them targeted on fast-track product development whilst at the same time nurturing their creativity, which is almost a contradictory task. I thought very hard about how we would do that and what we should do. I think it is so important to create innovative environments for people to work in whilst not losing track of where you are going and what is happening in that particular group. An early stage, unstructured research program in a university will be quite different from the sorts of things that we are doing where we like our projects to be three- to six-months long. But we do always want them to be creative and innovative and to solve problems in their way.

Mr QUICK—So how is the factory, the building, the dynamic hearing set up? With people wandering all around the world how do you keep in touch with what is going on? What is the selection process when you advertise for people and are getting people in who are perhaps deep

inside, who love entrepreneurship and innovation but some of the academic things have knocked a bit of that out of them?

Dr Saunders—We have a very mixed group. We have people from all kinds of environments. We have people from university, from industry, from start-ups and from failed start-ups. We have thought of a lot of aspects. I think you asked very good questions. Our building was chosen very much to encourage an innovative environment. It is actually built around a courtyard and there is a lot of glass, so it is very conducive to a team environment. We have a real mix of private space and meeting spaces. We do a lot of things in the week to keep people together. We meet as a team every week to share what everyone is doing for the week to create that team awareness and to share the knowledge but also to make sure they care for each other and remember their responsibility to keep working as a team. Our team selection is not at all accidental. There was one great sporting coach, whose name I have forgotten, who said, ‘A great sports team has to have the right players, not necessarily the best players.’ We make sure that the people we are employing can work in that team environment.

We have a lot of information sharing for people who are on the road. I feel very supported when I am travelling. We try and give our staff, particularly our younger staff—and our average age is probably 30—a lot of support on the road with email contact and phone calls. They know that they will get what they need. Time works in our favour there. Very often if you are on site somewhere and you get a sticky problem towards the end of the day you can go back in the next morning with an answer that someone in Melbourne has worked out overnight. So we work very consciously to nurture that creativity but keep people in that environment, because I want everyone to grow while they are in that environment. I believe that we will contribute to Australia’s revenues and provide Australia with a team of 25 or 30 people who have grown in skill. We also take students. We have good links with students. I think that brings a really nice dimension to things.

Mr QUICK—Are they from universities or high schools?

Dr Saunders—We have supervised masters projects at the School of Audiology, and we have had a Swinburne industry based learning student every year from the start of our program. I think that has been really good for all parties. It is something we can give back.

Mr QUICK—And you want to retain that knowledge within Australia rather than have it wandering overseas and disappearing for five years?

Dr Saunders—We do want them to stay. We have a DSP team—an engineering team—that is envied by hearing aid companies overseas. We have absolutely shown that Australia can deliver the goods. I want to keep the people, so we try to and make it a work environment that is stimulating.

CHAIR—Thank you very much. That was really interesting. Thank you for the war stories. I am sorry that you could not tell us more about the disengagement from the CRC but I imagine that it was a bit sensitive. I thank the Hansard staff. That was really useful. I think it contributed a lot to our insights.

Dr Saunders—I hope so. It is great that you are doing this.

Resolved (on motion by **Mr Jenkins**):

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

Committee adjourned at 3.39 pm